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US Army Corps  
of Engineers  
Waterways Experiment  
Station

Wetlands Research Program Technical Report WRP-RE-1

**Proceedings of the US Army Corps of Engineers  
Wetlands Workshop, Aurora, Colorado  
13-15 September 1989**

by Mary C. Landin, Ellis J. Clairain, Jr., Russell F. Theriot  
William L. Klesch, Jesse A. Pfeiffer, Jr.

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91-15789



September 1991 - Final Report  
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	<u>Task</u>		<u>Task</u>
CP	Critical Processes	RE	Restoration & Establishment
DE	Delineation & Evaluation	SM	Stewardship & Management

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REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
<small>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.</small>					
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE September 1991		3. REPORT TYPE AND DATES COVERED Final report	
4. TITLE AND SUBTITLE Proceedings of the US Army Corps of Engineers Wetlands Workshop, Aurora, Colorado, 13-15 September 1989				5. FUNDING NUMBERS	
6. AUTHOR(S) Mary C. Landin      Ellis J. Clairain, Jr.      Russell F. Theriot William L. Klesch      Jesse A. Pfeiffer, Jr.					
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) USAE Waterways Experiment Station, Environmental Laboratory 3909 Halls Ferry Road, Vicksburg, MS 39180-6199; HQUSACE, Washington, DC 20314-1000				8. PERFORMING ORGANIZATION REPORT NUMBER Technical Report WRP-RE-1	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) US Army Corps of Engineers, Washington, DC 20314-1000				10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES Available from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161					
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited				12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words)  The Wetlands Workshop was attended by 74 US Army Corps of Engineers (USACE) representatives. The purpose of the workshop was to identify needs and concerns related to USACE Division and District wetlands activities. Prior to the workshop, a questionnaire was sent to all USACE offices asking for field input on wetlands; results were compiled and made available to workshop participants (Appendixes A and B).  Workshop information was provided informally to Headquarters, USACE, for use in developing wetlands guidance and direction of the current USACE Wetlands Research Program, which is funded at \$22 million through FY 93.  After the opening plenary session, workshop participants were assigned to one of six technical breakout sessions, where they listed all items of concern in their topic area, voted on each item, and ranked each as a high, medium, or low priority. Each group also summarized its findings for presentation in the final plenary session. These findings have been used to prepare the research program development report. This miscellaneous paper was written on the basis of notes and tapes from the workshop, and on the developments leading to the current research program.					
14. SUBJECT TERMS Creation      Impacts      Remote sensing      Stewardship Delineation      Management      Research      Wetlands Evaluation      Mitigation      Restoration				15. NUMBER OF PAGES 104	
				16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED		18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED		19. SECURITY CLASSIFICATION OF ABSTRACT	
20. LIMITATION OF ABSTRACT					

13. (Concluded).

Copies of these workshop proceedings were provided informally to all workshop participants, and their reviews were incorporated into the final proceedings document. Following the workshop, the US Army Engineer Waterways Experiment Station, with the assistance of an appointed 14-member Field Review Group made up of USACE field office representatives and 7 Technical Monitors from Headquarters, USACE, developed the research program framework that became the USACE expanded Wetlands Research Program.

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## PREFACE

The US Army Corps of Engineers (USACE) Wetlands Workshop was conducted to identify wetlands information needs related to USACE Division and District activities, and was attended by 74 USACE representatives. Dr. William L. Klesch, Chief, Office of Environmental Policy (CECW-PO), Headquarters, USACE (HQUSACE), was workshop moderator, and Dr. Mary C. Landin, US Army Engineer Waterways Experiment Station (WES), was workshop coordinator.

Proceedings of the workshop were prepared by Dr. Landin. Workshop background information was presented by Dr. Klesch and Mr. Jesse A. Pfeiffer, Jr., HQUSACE. Questionnaires leading to the workshop (Appendix A) were compiled by Drs. Landin and Mark LaSalle and Mr. Ellis J. Clairain, Jr., all of WES. Questionnaire results (Appendix B) were compiled by Dr. Landin and Mr. Clairain.

Technical reviews and comments on these Proceedings were provided by Mr. E. Carl Brown, Chief, Wetlands and Terrestrial Habitat Group, WES; Messrs. Michael L. Davis, E. Zell Steever, and James Wolcott, HQUSACE; Mr. Russell F. Theriot, Manager, Wetlands Research Program (WRP), WES; Dr. Dennis R. Smith, Assistant Technical Director, WES; Drs. Marian P. Rollings and James S. Wakeley, WES; the WRP Planning Group; and the WRP Peer Review Group. The WRP Planning Group members were Dr. Edwin A. Theriot, Dr. Landin, Dr. Rollings, Mr. Clairain, Dr. John W. Barko, Mr. Bruce A. Ebersole, Mr. Mitch A. Granat, Mr. Mark R. Graves, Dr. Charles R. Lee, Dr. James H. May, Ms. Joan Pope, Dr. Lawson M. Smith, and Mr. Jack K. Stoll, all of WES. Members of the WRP Peer Review Group were Dr. Smith (Chairman), Dr. Don C. Banks, Mr. William H. McAnally, Dr. Raymond L. Montgomery, Mr. Donald L. Robey, and Dr. C. Linwood Vincent, all of WES. Copies of the Proceedings were sent to each USACE element commander, and comments received from the various elements and from HQUSACE were included in this miscellaneous paper.

During the preparation for and conduct of the wetlands survey and workshop, and preparation of the proceedings, supervisory guidance was provided by Mr. E. Carl Brown, Chief, Wetlands and Terrestrial Habitat Group, Environmental Resources Division (ERD), Environmental Laboratory (EL); Dr. Conrad J. Kirby, Chief, ERD; and Dr. John Harrison, Chief, EL.

COL Larry B. Fulton, EN, was Commander and Director of WES. Dr. Robert W. Whalin was Technical Director of WES, and Dr. Dennis R. Smith was Assistant Technical Director.

This report should be cited as follows:

Landin, Mary C., Clairain, Ellis J., Jr., Theriot, Russell F., Klesch, William L., and Pfeiffer, Jesse A., Jr. 1991. Proceedings of the US Army Corps of Engineers Wetlands Workshop, Aurora, Colorado. Technical Report WRP-RE-1. Vicksburg, MS: US Army Engineer Waterways Experiment Station.



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## AGENDA

### US ARMY CORPS OF ENGINEERS WETLANDS WORKSHOP Doubletree Hotel, 13696 East Iliff Place, Aurora, CO 80014 13-15 September 1989

#### Tuesday, 12 Sep 89

- 1600-2000 Registration table open—Foyer, Lobby Floor  
1800-2000 Mixer—Mt. Sopris Room, Lobby Floor  
2000-2100 Facilitators and Recorders Briefing—Conference  
Room 225, 2nd Floor

#### Wednesday, 13 Sep 89

- 0700-0800 Registration table open—Foyer, Lobby Floor  
0800-1000 Call to Order—Main Ballroom  
Dr. William L. Klesch, Chief, Office of  
Environmental Policy, HQUSACE, Moderator  
Workshop Announcements and Arrangements—  
Dr. Mary C. Landin, CEWES, Workshop Coordinator  
Overview of HQUSACE Activities Related to Policy  
on Wetlands Conservation and Management—  
Dr. Klesch  
The View from Research and Development at HQUSACE—  
Mr. Jesse A. Pfeiffer, Jr., Research and Development, HQUSACE  
Summary of Wetland Questionnaire Results—  
Mr. Ellis J. Clairain, Jr., CEWES  
1000-1030 Break—Foyer  
1030-1145 Introduction to Breakout Topics—Mr. Russell F. Theriot,  
Wetlands Research Program Manager, CEWES  
Procedures for Working Groups—Mr. E. Carl Brown,  
CEWES  
1. Wetland Delineation and Evaluation—Mr. Clairain,  
Facilitator, and Mr. Rodney L. Woods, Recorder  
2. Wetland Restoration and Development—Dr. Landin,  
Facilitator, and Dr. John J. Ingram, Recorder  
3. Minimizing Impacts on Wetlands (including  
Cumulative Impact Analysis)—Mr. Don L. Robey,  
Facilitator, and Mr. Robert J. Whiting, Recorder  
4. Wetlands Change Assessment Techniques—  
Dr. Michael R. Palermo, Facilitator, and  
Mr. Jack Stoll, Recorder  
5. Wetlands Stewardship and Management—Mr. Brown,  
Facilitator, and Mr. Scott Miner, Recorder  
6. The Role/Status/Importance of Wetlands on a  
Regional Basis, Mr. Edwin A. Theriot, Facilitator, and  
Dr. Thomas L. Hart, Recorder  
1145-1315 Lunch (on your own)

- 1315-1600 Breakout sessions
1. Wetland Delineation and Evaluation—  
Conference Room 225, 2nd Floor
  2. Wetland Restoration and Development—  
Conference Room 625, 6th Floor
  3. Minimizing Impacts on Wetlands (including  
Cumulative Impact Analysis)—  
Conference Room 425, 4th Floor
  4. Wetlands Change Assessment Techniques—  
Conference Room 525, 5th Floor
  5. Wetlands Stewardship and Management—  
Conference Room 226, 2nd Floor
  6. The Role/Status/Importance of Wetlands on a  
Regional Basis—  
Conference Room 325, 3rd Floor
- 1600-1630 Break—Foyer
- 1630-1730 Reconvene general session—Main Ballroom
- 1900-2100 Facilitators and Recorders meeting—  
Conference Room 225, 2nd Floor
- Dinner on your own

#### **Thursday, 14 Sep 89**

- 0800-1000 Continue breakout sessions (same conference rooms)
- 1000-1030 Break—Foyer
- 1030-1200 Continue breakout sessions (same conference rooms)
- 1200-1330 Lunch (on your own)
- 1330-1530 Continue breakout sessions (same conference rooms)
- 1530-1600 Break—Foyer
- 1600-1730 Continue breakout sessions (same conference rooms)
- Dinner on your own

#### **Friday, 15 Sep 89**

- 0800-1000 Reports to entire group from breakout sessions—  
Main Ballroom—session facilitators
- 1000-1030 Break—Foyer
- 1030-1130 Wrap-up Session—Dr. Klesch



## ATTENDEES

- BARKO, John W., CEWES-ES-A, 3909 Halls Ferry Road, USAE Waterways Experiment Station, Vicksburg, MS 39180-6199 (601/634-3654)
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**PROCEEDINGS OF THE US ARMY  
CORPS OF ENGINEERS WETLANDS WORKSHOP  
AURORA, COLORADO, 13-15 SEPTEMBER 1989**

**WORKSHOP INTRODUCTION**

The Wetlands Workshop was attended by 74 US Army Corps of Engineers (USACE) representatives from 29 Districts, 6 Divisions, 6 laboratories, and Headquarters, USACE (HQUSACE). The workshop was conducted to identify wetlands information needs related to USACE Division and District activities. Prior to the workshop, a questionnaire was sent to all Districts and Divisions asking for field input on wetlands needs and concerns (Appendix A). Appendix B provides results from the 204 responses to the questionnaire.

The information obtained from USACE field elements was provided informally to HQUSACE for use in developing wetlands policy and direction of Wetlands Research Program (WRP) that began in FY 91. This research program involves a 3-year effort and is funded at \$22 million. The US Army Engineer Waterways Experiment Station (WES) is providing draft comprehensive technical research program documentation for the WRP and has set up research task areas based upon the results of the workshop and final HQUSACE and field office review.

After an opening plenary session, participants were assigned to one of the following six technical breakout sessions: (1) wetlands delineation and evaluation; (2) wetlands restoration and development; (3) minimizing impacts in wetlands, (4) wetlands change assessment techniques; (5) wetlands stewardship and management; and (f) status, role, and importance of wetlands on a regional basis. Session assignments were made to equalize as nearly as possible USACE Division, District, and other USACE office representation.

Participants were instructed to list all items of concern to them involving wetlands within their topic area, regardless of type of item (policy, technical needs, technology transfer, etc.). These items were to be discussed and assigned to categories of the breakout group's choosing. Each breakout group was asked to vote on each item, and rank each as a high, medium, or low priority. Finally, each group was to summarize its findings for presentation in the final plenary session at the end of the workshop.

At the conclusion of the workshop, facilitators of each technical session presented their findings in the final plenary session. This was followed by closing remarks from HQUSACE that encouraged continued dialogue among workshop representatives and gave immediate plans for the current WRP direction. This miscellaneous paper was written on the basis of notes and tapes from the workshop.

Since the workshop was conducted, six task areas for the current WRP have been developed and funded: (1) Task Area I – Interagency Coordination; (2) Task Area II – Technology Transfer; (3) Task Area III – Critical Processes in Wetlands; (4) Task Area IV – Wetlands Delineation and Evaluation; (5) Task Area V – Wetlands Restoration,

Protection, and Establishment; and (6) Task Area VI – Wetland Stewardship and Management. Detailed descriptions, work units, approaches, and products of these task areas are given in the WRP documentation report.

A 14-member Field Review Group made up of representatives from various USACE field offices was established after the workshop to provide day-to-day input from Divisions and Districts with regard to their wetlands concerns and needs. In addition, 7 Technical Monitors were appointed by HQUSACE to provide ongoing guidance to the WRP, and a WES oversight committee was appointed to ensure interdisciplinary, inter-laboratory involvement in the WRP work effort.

These proceedings and appendixes serve as the basis and background for the WRP. As such, they are provided as part of WRP ongoing technical information transfer.

OPENING PLENARY SESSION

**PROCEEDINGS OF THE US ARMY  
CORPS OF ENGINEERS WETLANDS WORKSHOP  
AURORA, COLORADO, 13-15 SEPTEMBER 1989**

**OPENING PLENARY SESSION**

1. The US Army Corps of Engineers (USACE) Wetlands Workshop was moderated by Dr. William L. Klesch, Chief, Office of Environmental Policy, USACE, who also made the opening address to establish the tone and working atmosphere of the workshop (especially the technical breakout sessions). Dr. Klesch's and Mr. Pfeiffer's addresses were taken from workshop tapes and are presented in the following paragraphs.

**Overview of Headquarters (HQ) USACE Activities Related to Policy  
on Wetlands Conservation and Management**

2. My name is Bill Klesch, and I will be serving as your moderator for this workshop. The workshop comes at a very opportune time, as I shall explain. When I was asked to be moderator, one of the things I was asked was to present to you some of the activities going on in HQUSACE related to wetlands and environmental initiatives in general. I would like to share some of these with you and what we hope to accomplish at this workshop.

3. First, the National Wetlands Policy Forum report published in November, 1988 contained a set of well over 100 recommendations related to wetlands conservation. As a result of the report and interest shown by the Assistant Secretary of the Army (Civil Works) (ASA(CW)), the Chief of Engineers LTG Henry J. Hatch convened an ad hoc committee on wetlands, and asked it for a reading on the USACE position and reaction to the Forum report. We convened a committee at HQUSACE composed of planning, regulatory, natural resources, research and development (R&D), and other offices, and examined the report. We completed our work in March, 1989 and basically underwrote and agreed with the majority of the Forum's recommendations. However, we did have two areas of concern.

4. First is the recommendation to have the states assume all wetlands regulation. The USACE position is that it can do a much better job at a national level than can 50 different state agencies using 50 different sets of regulations. The USACE continues to support a policy of allowing states to establish their own Section 404 Program using existing Federal regulations, if they choose to do so. Our second area of concern is with navigational servitude and whether or not states would recognize this with respect to commercial navigation. We felt that recommendations in the Forum report did not adequately address either issue.

5. In addition to reacting to the report, the ad hoc committee had two more wetland-related requests that came from the ASA(CW). He (Mr. Robert Page) wanted to know what USACE could do in the short term (6-9 months), in the immediate future, and in



the long term in response to the Forum recommendations. Mr. Page also wanted to know what USACE could do in the areas of wetlands restoration and development within the Regulatory, Planning, R&D, and O&M Divisions, particularly those involved in natural resources management. A second response for ASA(CW) was developed in June, 1989.

6. Third, ASA(CW) asked for the development of a comprehensive wetland program that would be conducted jointly with the US Environmental Protection Agency. We sent up a third report to ASA(CW) on this topic in July, 1989. So far, we have not received a response to any of the three reports. Part of the reason is because Mr. Page (assisted by his staff) is serving on President Bush's Domestic Policy Council (DPC) wetlands task force, and he anticipates some direction from the DPC, which has not been received yet, prior to initiating a major wetlands activity.

7. The DPC wetland task force has a number of charges. First, they are to revise and strengthen the existing Executive Orders related to wetlands protection and floodplain management. Second, they are to establish a 'no net loss' policy and direction for all Federal agencies. Third, they are to examine and recommend comprehensive involvement of the states. What has happened is that they have only met twice and haven't accomplished much with regard to policy development. Mr. Page and Dave Barrows (ASA staff) are our representatives on the task force, and have indicated informally that they would like to move quicker than the task force seems to be willing to do. I anticipate a reaction to one or more of our three reports within the next several weeks. With this backdrop of initiatives going on in Washington, you can see why this workshop is very timely and why we need your help.

8. Another important thing happening at HQUSACE is that LTG Hatch has begun an initiative on environmental engineering. You may or may not have heard that General Hatch believes the role of USACE is changing. In the past, USACE has had a rather narrow, traditional approach to flood control and navigation, but with the emerging awareness of environment in the United States, he believes USACE should be playing a greater environmental role. He has asked for a policy paper to be developed and widely distributed on USACE's role in environmental engineering. He is also planning a series of briefings with Chief Executive Officers and presidents of major environmental groups in the country, such as the National Audubon Society, National Wildlife Federation, the Wildlife Management Institute, and others. He plans to let them know what he expects of USACE, what USACE's emerging role in environmental engineering is, and to solicit their comments and ideas. At the same time, he has asked us to work with other agencies to do the same thing. We will be seeing a great deal more activity along these lines in the months to come.

9. Finally, Congress is very interested in wetlands. There are six to eight bills now in Congress dealing with wetlands in one way or another. A series of Congressional hearings on wetlands, in which General Hatch and Mr. Page have testified, have taken place. They both presented the positive things USACE has done and offered support for President Bush's proposed 'no net loss of wetlands' policy. The USACE will

definitely be more environmentally sensitive, and will continue to move forward with new initiatives in the environmental arena.

10. Where does that bring us today at this workshop? I see this workshop as unique from two standpoints. First, it provides for direct field input into and intimate involvement with emerging policy and direction of USACE. Second, you will be giving up-front guidance to the new Wetlands Research Program. This is an information-gathering meeting, and that represents an unusual opportunity for you, the field, to guide HQUSACE in the development of new policy and a new R&D program.

11. Products of this workshop will be used by HQUSACE. It will be very helpful to us to have a written field position on hand when requests from ASA(CW), Congress, or the DPC task force are received. Mr. Page, General Hatch, and their staffs are all very much interested in seeing the proceedings of this workshop, and I can't underscore enough the importance of getting your input. Having said that, I should point out that policy is going to evolve. The ASA(CW) is going to take a large role in policy direction—we cannot be so naive as to believe that all we put on paper will wind up as official USACE policy. It does not work that way, but I can assure you that you will be heard! I look forward to the discussions over the next 2 days. If you have any questions, please do not hesitate to ask.

### **The View from Research and Development at HQUSACE**

12. I am Jesse Pfeiffer, and I will cover wetlands from the research and development (R&D) side. We are definitely approaching this from all angles. Times are changing, and we are getting a lot 'greener' in the US Army Corps of Engineers (USACE). We never have been as 'brown' as we were painted, but we will be improving. At this workshop, we will be soliciting field input into USACE R&D activities. We have the HQUSACE, Waterways Experiment Station (WES), and other USACE laboratories here at the workshop to hear you. WES will be your recorders, facilitators, and staff. You folks take front stage. We will be trying to see that all of you get an equal chance to speak your mind. We deliberately invited working-level people, not your supervisors, because we need working-level input.

13. How did we get to where we are today? What about the Wetlands Research Program? Will it be funded? Well, the strongest signals I have ever seen for an R&D program are coming from the Presidential level, the Congressional level, and from the Office of Management and Budget (OMB). You know, USACE R&D usually has to spend 2 years answering every possible question as to why R&D should have funds to conduct a new USACE research program initiative. Then, if we are lucky and have tons of field input, we may get a program. In this case, the Wetlands Research Program, we are being asked to move forward quickly. We had the Wetlands Research Program in the FY 91 budget before we could even get our own HQUSACE act completely together! That is definitely a big change in the way new research programs are started.

14. When President Bush came into office, we were concluding a Memorandum of Agreement (MOA) with the National Marine Fisheries Service (NMFS). NMFS wanted

to continue the MOA, but USACE, who was paying for the MOA, didn't have money to do so. We envisioned proposing a modest wetland package so that we could continue what had been started under the USACE/NMFS MOA. So we talked to several offices in the Civil Works Directorate about such an effort, and worked out an outline. At about the same time, General Hatch established a 'no net loss of wetlands' task force to address the recommendation of the Forum report that Bill previously mentioned. The task force produced several documents concerning what USACE should or could do regarding these recommendations. Included in this was the discussion of a possible wetlands research effort. All of these things came together, and all of this happened after WES developed and sent out the questionnaire at our request that you folks filled out and returned.\*

15. Meanwhile, during mid-summer budget preparations for FY 91, OMB sent signals that they would be willing to include a wetland program in the FY 91 budget. From a USACE R&D standpoint, that is unprecedented. Nobody ever comes asking us to develop a program and offering us money for research. I told them that they needed to realize that it would be a big program, \$35 to \$40 million over about 7 years. They didn't even argue with me! John Elmore, in Operations, will be paying for the program out of O&M general funds. He told me that he thought this was so important to USACE's business that he was willing to pay for it. He agreed to the amount and size of the program.

16. An HQUSACE committee put together a draft outline in July 1989, and WES, at our request, developed a draft briefing paper in August. Everything was fine through the Office of the Assistant of the Army for Civil Works (ASA) staff, but Mr. Page himself said that 7 years was too long and he cut it back to 3 years and \$22 million. His reasons had to do with needing quick answers and responses within President Bush's administration. We all know three years is not long enough to address major wetland problems, or to carry out much field research, but we will live with what we have.

17. Back to the workshop, we want your input, and you and your commanders will get draft proceedings in the next few weeks for a chance at additional input. After that, WES will develop a draft program using this information, and you people will see that draft and have still another chance to comment. We have 1 year to get the program in place.

18. We are also expecting that this program will include interagency coordination and participation. We need it for 'credibility' because if God Himself said our data were correct, some people still would not believe it because it came from USACE. We will insist they be involved in demonstrations and projects. Their feet will get muddy and wet just like ours, and they will have responsibilities in the program. The other Federal agencies have no parallel program initiatives, and this will be their chance to work with us instead of against us.

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\* A copy of the WES survey is included as Appendix A of this document. Appendix B summarizes the 204 responses to the questionnaire, and Appendix C contains draft Wetlands Research Program fact sheets.

## TECHNICAL BREAKOUT SESSIONS

## **Wetlands Delineation and Evaluation**

19. The Technical Breakout Session, Wetlands Delineation and Evaluation, was attended by personnel from Division and District Field Offices, planning and regulatory elements, and coastal and interior regions. Members were Buddy Clairain (facilitator), Fred Weinmann (recorder), Rodney Woods (recorder), Larry Buck, Brad Daly, Lloyd Fanter, Mike Gilbert, Don Hill, Mitch Isoe, Andy Roseau, and Larry Vinzant. The group's objective was to identify USACE planning and regulatory needs related to issues associated with wetland delineation and evaluation.

20. A total of 67 issues, problems, or concerns were identified and discussed. These were further refined and consolidated into 26 major items, then grouped under three sub-topics: (a) delineation, (b) evaluation, and (c) technology transfer. The group then rated the importance of each item according to geographic application and relevance to US Army Corps of Engineers (USACE) field personnel. All issues were considered important nationally although some topics must be developed on a regional basis throughout the United States. Each issue was rated as either high, medium, or low importance by field personnel.

21. A general recommendation of the group was that the role of USACE change from that of a site-specific planning and regulatory agency to a comprehensive, landscape-scale water resources development agency. The USACE must begin to examine wetlands within a broad landscape context and use available techniques such as Geographic Information Systems (GIS), and must develop new technologies such as cumulative impact analysis procedures to achieve this approach.

22. There is also a pressing need for research to examine topics associated with wetland delineation and evaluation. In addition, we must do a better job of consolidating existing technical information and distributing information to the field. Research goals and technical products must be designed to ensure that this landscape management role is performed.

### **Wetlands delineation**

23. The group felt that the recently published Federal Manual for Identifying and Delineating Jurisdictional Wetlands must be revised in four separate but related areas and future revisions should be focused toward developing region-specific techniques for wetland boundary determinations.

24. **Vegetation.** Several studies are needed to improve the technical accuracy of the vegetation component of the manual. Many members of the group felt that regional variations in the indicator status of the species on the National List of Plant Species that Occur in Wetlands must be identified. Research is needed to determine, through field and laboratory studies, the distribution of selected species along the moisture gradient. Studies similar to those used to develop the Flood Tolerance Index values for bottomland hardwood forest species should be initiated in many different regions of the United States. Study results should be used to modify, where needed, the indicator status given in the National Wetlands Inventory (NWI) wetland plant list. Such studies would pro-

vide the sound scientific bases needed for establishing the indicator status of certain plant species and provide regionally accurate information. A computer program is also needed for calculation of the US Department of Agriculture Soil Conservation Service prevalence index value to the indicator status of composition. Also needed is a correction to the basal area formula discrepancy in the plotless or Bitterlick method of the manual.

**25. Soils.** Basic studies are needed to refine existing hydric soil indicators and develop additional indicators for particular soils such as molisols and spodosols. There are also specific types of hydric soils that occur in certain regions of the United States, such as red clays in the Southwest, that do not exhibit the hydric soil indicators listed in the manual. These soils must be studied and their hydric characteristics identified to aid field personnel in wetland boundary determinations. Automated field techniques are needed to determine oxygen content, redox potential, soil temperature, and other soil characteristics which may indicate more clearly whether a soil is hydric. In many areas of the United States, basic information is lacking on many soil types. Studies are needed to increase the soils database for those areas, such as Alaska, where soils have not been fully mapped.

**26. Hydrology.** The manual requires that an area be inundated or saturated for at least 7 consecutive days during the growing season to satisfy the hydrologic parameter. However, regional differences in the length of the growing season make this criterion too stringent in some regions and not stringent enough in others. Additional studies are needed to establish accurate inundation requirements to reflect differences in growing seasons. Wetland determinations are often required in areas such as isolated wetlands where even limited hydrologic data are not available. Field techniques are needed to assess wetland hydrology in areas lacking nearby stream gage data.

**27. Regionalization/problem areas.** The manual was developed as a national technique but often lacks adequate sensitivity to regional differences in certain soil types, hydrology, and vegetative characteristics, as discussed above. There are also particular wetland types such as bottomland hardwoods, pocosins, playa lakes, vernal pools, tundra, and others that do not exhibit many of the wetland indicators currently used in the manual. Each of these particular wetland types and selected others must be studied and wetland indicator characteristics determined and integrated into the delineation method.

### **Wetlands Evaluation**

**28.** Techniques are needed to provide rapid, technically accurate evaluation of wetland functions and values while remaining sensitive enough to identify regional differences in wetland types. Although the Wetland Evaluation Technique (WET) and the Habitat Evaluation Procedures (HEP) are often used, HEP is limited to one major function and WET must be revised to provide a more rapid assessment and refined to reflect regional characteristics. Three broad study needs were identified and are discussed below.

29. **Refine WET.** There is an important need to develop a reliable wetland evaluation technique by either refining WET and/or developing alternative approaches to include several additional levels of analysis beyond those presently available in WET.

30. **Regionalization.** Techniques are needed to evaluate wetland functions and values on either a regional basis or by wetland type. These techniques must be sensitive to differences in wetland types and geographically unique qualities.

31. **Quantify functions and values.** Basic field and laboratory research is needed to determine the physical, chemical, and biological processes that influence wetland functions and values. This research must be accomplished for specific wetland functions and types. Results must be integrated into the development of techniques for field personnel.

### **Technology transfer**

32. The group was very concerned about the limited time that regulatory staffers have to acquire and study existing information and integrate that knowledge base into field decisions. There was a sense of frustration that scientific information or specific techniques are available to improve the quality of decisions and timeliness of responses, but field personnel are often unable to utilize, or are not aware of, these databases. Different forms of technology transfer were discussed and grouped into the following four broad topics discussed below.

33. **Training.** Additional training is needed in hydric soils and in the use of WET. The courses should be provided in different regions of the United States. Development of training videos and cassettes is also needed.

34. **Available technology.** Members of the group felt that there are several types of field and office equipment such as GIS and software packages that may have direct field application. These tools must be examined and their potential applications assessed and summarized.

35. **Data synthesis.** Field personnel often need to know and have readily available results of published wetland research but often lack the time to research and summarize results. There is a strong need to develop regional summaries of published wetland literature and present results on a regional basis. A computer literature retrieval system should also be developed to provide rapid, easy access to published literature.

36. **General.** Several additional types of technology transfer are needed which do not fall within those broad categories identified above. Some particular needs include development of regional field manuals to aid in identification of hydric soils and hydrophytic vegetation. There is also the need to develop a wetland delineation and evaluation certification program for Federal personnel and for private consultants. The certification program should be developed on a regional basis. Specific guidelines should be prepared for private consultants and contractors to ensure consistency in preparing wetland delineations and evaluations.

## Items identified and discussed

37. The following table lists the 26 items that were discussed, and ranks them by priority. Scores were determined by assigning a value of 3 points to a "high" ranking, 2 points to a "medium" ranking, and 1 point to a "low" ranking. This system was used by all six working groups.

	<u>H</u>	<u>M</u>	<u>L</u>	<u>SCORE</u>
<b>Wetlands Delineation</b>				
<b>Vegetation</b>				
Refine the wetland plant list to reflect scientific studies	9	1	0	28
Refine specific sections in the manual regarding vegetative sampling procedures	2	6	2	20
<b>Soils</b>				
Conduct basic research on soils to develop accurate field criteria	7	3	0	27
Refine the hydric soils list	4	5	1	23
<b>Hydrology</b>				
Develop techniques to assess hydrology in isolated wetlands or where hydrology data are lacking	7	3	0	27
<b>Regionalization/problem areas</b>				
Develop region-specific techniques for delineating particularly difficult wetland boundaries in various wetland types	10	0	0	30
<b>General</b>				
Develop standardized techniques for conducting remote sensing studies	3	6	1	22
Integrate National Wetland Inventory (NWI) maps into regulatory and planning projects	4	1	5	18
Determine how long wetland delineations are likely to remain valid	0	2	8	12
Refine the 7-day criteria for development of anaerobic soil conditions	6	4	0	26
Develop criteria for quality control on written products and reports received from consultants	3	4	3	24

(Continued)



	<u>H</u>	<u>M</u>	<u>L</u>	<u>SCORE</u>
<b>Wetlands evaluation</b>				
<b>Refine WET</b>				
Develop additional levels of analysis and enhance technical accuracy	9	1	0	28
<b>Regionalize WET</b>				
Develop regional versions of a wetland evaluation technique by wetland type	7	3	0	27
<b>Increase understanding of functions and values</b>				
Quantify functions and values	4	5	1	23
Develop guidelines for comparing functions and values of wetlands versus uplands	0	7	2	16
Integrate results of WET with the Section 404(b)(1) guidelines	1	4	5	16
<b>Technology Transfer</b>				
<b>Training</b>				
Provide additional training on hydric soils	10	0	0	30
Provide additional training on WET	8	2	0	28
<b>Available technology</b>				
Examine existing technology and assess its applicability to USACE needs including GIS technology, software, and hardware/tools	8	2	0	28
<b>Data synthesis</b>				
Summarize existing wetland research	5	5	0	25
Develop a computer literature retrieval system to access wetland literature and other wetland databases	5	4	1	24
<b>General</b>				
Develop a process to enhance communication with other Federal agencies	7	3	0	27
Develop a technique to improve internal communication within USACE such as a WETNET similar to DREDGENET	5	4	1	24

(Continued)

	<u>H</u>	<u>M</u>	<u>L</u>	<u>SCORE</u>
<b>Technology Transfer</b>				
<b>General</b>				
Develop a certification process for USACE personnel and consultants	4	5	1	23
Develop an on-call assistance program for planning, similar to DOTS and WRAP	3	6	1	16
Develop guidelines and scopes of work for contractors to conduct delineations and evaluations	1	4	5	16

## **Wetlands Restoration and Development**

38. The need for properly designed and implemented wetlands restoration and development, given the dramatic annual wetlands losses occurring in the United States, is recognized as extremely important by the Administration and by all Federal and State agencies. The US Army Corps of Engineers (USACE), with its large interdisciplinary staff located throughout the nation, and its considerable prior experience in wetlands restoration, development and regulatory responsibilities, is viewed by many people as the one agency that can stem the tide of wetland losses. The Technical Breakout Session, Wetlands Restoration and Development, identified and discussed a number of items that would assist USACE field offices in effectively restoring and developing wetlands. The identified technology needs include criteria for wetland development or restoration; information on how to measure success, failure, or change in a developed or restored wetland; and guidance on the recovery from land-use impacts and losses in wetlands. A list of prioritized wetland restoration and development demonstration projects was also identified as part of these technology needs. The group recognized that without demonstrations of various wetland types throughout the United States, using the best available technology combining environmental expertise and engineering structures and experience, USACE could not "prove" that wetlands restoration and development were logical and feasible means of lessening wetlands losses. The group also emphasized that these wetlands would be developed through a cooperative effort among agencies and local sponsors.

39. Members of the working group were Mary Landin (facilitator), John Ingram (recorder), Hugh McClellan, Craig Seltzer, Scott Miner, Bob Kansinger, Jake Redlinger, Ken Brunner, Cecil Soileau, Wade Whittinghill, Elmar Kurzbach, Mitch Granat, Joan Pope, John Barko, Edward Hughes, Mike Trawle, and Lloyd Saunders. Only District/Division representatives were given the opportunity to present a need regarding wetlands restoration and development, and only they were allowed to vote to rank items as high, medium, or low priorities. The group's participants identified 71 items that were later assigned by the group to four categories: (a) policy, (b) technology needs, (c) technology transfer, and (d) demonstration projects. The following paragraphs summarize the high priority items within each category.

### **Policy**

40. Seventeen policy items regarding wetland restoration and development were identified; 12 were voted as high priorities. The group recognized that without some basic guidance from Headquarters (HQ)USACE, and some policy changes throughout USACE, wetlands restoration and development would still be considered a secondary objective in projects. The cost/benefit ratio that makes USACE adhere to the least-cost, environmentally sound project alternative frequently keeps wetlands work from being the chosen alternative. In general, these policy items concern mandates, funding procedures, design guidance from HQUSACE, and mitigation. High priorities were summarized into six major sub-topics.

41. **Give USACE the mission to restore and develop wetlands.** The group saw the need for a clear mandate from Congress giving USACE the authority to restore and/or develop wetlands, and that mandate should not be tied just to O&M.

42. **The USACE needs funding and/or appropriations in addition to O&M moneys dedicated to long-term wetland restoration and development.** To date, O&M funds have been the source of most wetlands restoration and development work in USACE. This automatically relegates wetlands work to a secondary objective after maintenance work in O&M budgets.

43. **Assist cost-sharing sponsors with coordination and innovative funding.** The group saw a need for guidance on how to access the USACE budgetary process and interact with local sponsors to seek innovative funding sources (cost sharing) for wetlands work.

44. **Guidance and authority from HQUSACE.** HQUSACE needs to present clear authority to engineering sections of USACE District offices regarding incorporation of wetlands restoration and development into USACE projects (both new and existing). Most supervisory levels in Districts do not perceive that this direction has been given from HQUSACE.

45. **USACE offices should be encouraged to enhance communication and cooperation laterally between office elements.** Environmental projects are multi-disciplinary, and should be staffed with personnel from various offices, both within Districts and within Divisions. This would prevent the disadvantage found in "stovepiping" that sometimes prevents efficient project accomplishment, to the detriment of budget and project goals.

46. **Mitigation.** Mitigation needs were frequently discussed in this group, and included such items as finding suitable wetland restoration and development sites, arriving at fair compensation, the feasibility of having private developers build wetlands, the need to prioritize the most critical wetland types for mitigation, mitigation banking, and a number of other issues.

#### **Technology needs**

47. Thirty-two items regarding technology needs were presented by the field representatives. They strongly recognized the need for engineering and environmental design criteria and guidelines for monitoring and managing these wetlands once developed and/or restored. The field representatives voted on 10 items as high priorities and 12 as medium priorities. The following five major sub-topics were summarized from the high priority items.

48. **Critical elements of existing wetlands.** A number of critical characteristics of existing wetlands need to be better understood. These cross environmental, physical science, and engineering disciplines. The most important of these are:

- a. Hydrology and physical processes.
- b. Hydric soils (chemical, physical properties, geology).

- c. Vegetation (baseline criteria).
- d. Fish and wildlife habitat requirements.

49. **Design criteria.** Even though design criteria exist for building and restoring wetlands using dredged material, the field representatives did not feel that they had adequate information to relate those criteria to building or restoring all types of wetlands, especially those involving mitigation or in non-dredging projects such as lakes and reservoirs, streambanks or some types of regulated wetlands. Technical needs include design criteria for:

- a. Vegetation.
- b. Other environmental criteria.
- c. Engineering structures (including bioengineering).
- d. Movement and transport of wetland soils.
- e. Hydrologic requirements.
- f. Physical, chemical, and biological properties of hydric soils.
- g. Costs and cost sharing.

50. **Monitoring.** The only way to determine success or failure, and to document changes, in a wetland project is to develop monitoring criteria and collect data. Monitoring allows the measuring of project status against project objectives, provides baseline data that can be used for future wetland projects, and provides USACE credibility with other agencies who may be critical of the wetland project. Actual inter-agency participation in wetland monitoring, or at least concurrence, is viewed by the field as necessary to add credibility to the wetlands project and to the monitoring effort.

51. **Management.** Management of wetlands to maintain appropriate elevation, configurations, water levels or sources, vegetation, or project objectives is necessary to ensure viable continuation of new wetlands. Guidelines are needed for both short- and long-term management. Wetland management is a logical follow-up to a comprehensive monitoring program.

52. **Technical manuals.** Technical guidelines, manuals, and handbooks are needed and were strongly recommended by the field to address combinations of all of the above four subtopics.

### **Technology transfer**

53. Sixteen items were identified by the field representatives as technology transfer needs. Ten items were voted as high priorities, and are summarized under the following three sub-topics.

54. **Field and office checklists for wetland functions and values on natural and man-made wetlands.** Such checklists would make quick assessments easier, as well as assure that no function or value would be overlooked, since it would have to be marked affirmative or negative on the checklist before proceeding to the next item.

**55. Technical guidelines.** This included such needs as improving aquatic Habitat Evaluation Procedures (HEP) as related to restoration and development projects; guidelines for incorporating wetland design criteria into existing O&M and new work projects; design, implementation, and evaluation guidelines for wetland development for use by permit applicants and USACE offices; field handbooks; monitoring guidelines; more user-friendly software; and a wetland restoration and development procedural matrix.

**56. Generate public relations on USACE wetland projects.** Videos, lay-language pamphlets and articles, highly visible demonstration projects, 1-day traveling seminars, and a wetland training course especially tailored for design engineers were some of the items brought up for discussion.

### **Demonstrations**

**57.** Nine items were presented and discussed by field representatives. Many were regional in both location and wetland type, and were purposely not voted on for this reason. Two non-regional demonstration items were voted as having high priorities for the field and are discussed below. Numerous demonstration sites are needed, and these should be interagency efforts with the US Fish and Wildlife Service, US Soil Conservation Service, the states, the National Audubon Society, the US Forest Service, and local sponsors. Demonstrations should include all aspects of cooperation, including sharing costs (land acquisition, data analyses, logistical and equipment costs) and sharing work (site selection, baseline data collection, monitoring).

**58. Wooded wetlands.** Non-coastal wooded wetlands of nearly every type were brought up in the discussions. Those viewed as most critical, with the least amount of available information for restoration and development, were bottomland hardwoods, swamps and bogs, riparian wetlands, and floodplain forests.

**59. Disturbed and/or degraded wetlands.** Again, discussions centered primarily around non-coastal wetlands. However, problems identified also included wetland types in coastal areas. The group discussed the following types of wetland restoration problems: illegal fill, abnormal sedimentation from upstream erosion (silted-in lakes, reservoirs, and existing wetlands), coastal erosion and subsidence in numerous locations (especially in south Louisiana and Texas, the Great Lakes, south San Francisco Bay, Chesapeake Bay, and certain areas along the Atlantic coast), breaching of dikes and levees, and reclamation of marginal farmland into bottomland hardwoods.

**60. Regional wetlands.** These wetland demonstration projects were not voted on to prevent lower scores from regional priorities by group participants. They included need for demonstrations of west coast marsh and seagrass bed development, eelgrass development in anoxic sediments, arctic and subarctic wetlands, vernal pools, tropical rain forests and other wetlands, prairie marshes and wet meadows, northeast swamps and bogs, reservoirs, borrow pits, and urban wetlands.

## Items of discussion

61. Of the 71 items presented by field representatives in this working group, those items ranked high and medium (and an occasional low due to regionality) are listed according to the category to which each was later assigned. An asterisk is used to identify those receiving high priority votes, and the vote each received follows the item (H-M-L), followed by the total score received. Where there was overlap of an item between categories, it is listed under the first category only (so that the totals within categories will not equal 71 items).

62. **Policy.** Although policy items were not supposed to have been addressed in technical breakout sessions, members of the group had a number of items regarding policy that they felt strongly about, and wanted them to be brought forward into workshop discussion.

- \*a. Need clear mandate from Congress giving USACE authority to restore and develop wetlands (9-0-0), 27.
- \*b. Need to access the USACE budgetary process and interact with local sponsors to seek innovative funding sources for wetlands development (9-0-0), 27.
- \*c. Need guidance for incorporating wetland restoration and development into existing O&M and new work projects (8-1-0), 26.
- \*d. Pursue measures of incorporating wetlands into flood control projects (8-1-0), 26.
- \*e. Need USACE to assess and develop less expensive water control structures which have a higher degree of risk than those applied in flood protection projects (6-2-1), 23.
- \*f. Strongly pursue means of enhancing communication between District elements for environmental projects (5-4-0), 23.
- \*g. Define fair compensation for losses in mitigation requirements (quantity and location; urban versus rural) (9-0-0), 27.
- \*h. Set objectives prior to mitigation, with interagency coordination (8-1-0), 26.
- \*i. Address out-of-kind mitigation (6-2-1), 23.
- \*j. Mitigation banking procedures—how, when, where, what's its value? (8-1-0), 26.
- \*k. What to do if you cannot find a suitable mitigation site? (4-5-0), 22.
- \*l. What is the economic value of an acre of wetland on an annual basis? (5-1-3), 20.
- m. Feasibility of having private developers build wetlands on USACE land (4-2-3), 19.

- n. Charge permit applicants who destroy small wetlands and use funds for future large-scale wetland restoration and development (3-4-2), 19.
- o. Give weighted emphasis to on-site mitigation in urban areas (3-3-3), 18.
- p. Document the most impacted wetland types and direct mitigation needs to offset those losses (3-4-2), 19.
- q. Revise internal coordination regulations placing value engineering earlier in the planning process (2-2-5), 15.

**63. Technology needs.** Some of these items were combined before the final vote. Gaps in technology that would allow wetlands restoration and development to proceed successfully under all circumstances (not just using dredged material) were of major concern.

- \*a. Determine monitoring criteria (how much, how long, and at what cost) (7-2-0), 25.
- \*b. Define a wetland qualitatively and quantitatively, and develop baseline criteria for successful wetlands by type (6-3-0), 24.
- \*c. Determine critical elements of existing wetlands (9-0-0), 27.
- \*d. Study natural hydrology of wooded wetlands to determine design parameters for wetland development (7-1-1), 24.
- \*e. Develop design criteria for wetland mitigation (9-0-0), 27.
- \*f. Determine how to manage estuarine marshes and select good mitigation sites (6-1-2), 22.
- \*g. Develop technical manuals and guidance for wetlands restoration and development by wetland types, structured along the three-parameter approach, that address soils, hydrology, and vegetation (8-1-0), 26.
- \*h. Study active hydrologic systems within manmade wetlands-unmanaged versus managed (5-4-0), 23.
- \*i. Address artificial hydrology and physical processes of developed wetland systems in urban landscapes (6-2-1), 23.
- \*j. Develop guidelines for performance criteria for functioning wetlands (success criteria) (7-1-1), 24.
- \*k. Determine best mechanisms for long-term production and management of wetlands (4-4-1), 21.
- \*l. Quantify wetland restoration and development outputs (what are we really getting for our money?) (8-1-0), 26.
- m. Determine how to manage sediment and water interchanges (1-3-5), 14.
- n. Develop design criteria for wet meadows and prairie marshes (1-0-8), 11.



- o. Investigate use of bioengineering and innovative breakwaters in shoreline stabilization, wetland protection, and wetland development (2-2-5), 15.
- p. Investigate types of gates and water control structures for managing water levels in wetlands; e.g., buoyancy-operated gates (3-4-2), 19.
- q. Investigate feasibility of protecting wetlands using engineering features as the project's mitigation (2-1-6), 14.
- r. Develop techniques for wetland restoration in reservoirs and lakes, including reclamation of degraded and silted-in reservoirs and lakes, as forested wetlands (1-3-5), 14.
- s. Establish control of exotic and pest plant species on new wetland sites (0-3-6), 15.
- t. Determine how to mitigate for surface mining and industrial sites (natural succession vs. site planting) (1-2-6), 15.
- u. Examine change in site use versus value of the restored site (0-6-3), 15.
- v. Establish guidelines for selecting dryland sites which would make good wetlands (5-1-3), 20.
- w. Determine how to find suitable marsh development sites (2-5-2), 18.
- x. Investigate wetland restoration and development in conjunction with groundwater recharge (2-4-3), 17.
- y. Assess restoration versus rehabilitation regarding industrial impacts on highly sensitive sites (0-0-9), 9.
- z. Research the transport of sediment by hydraulic channels (replacing pipe transport) (1-2-6), 13.
- aa. Create wetlands adjacent to existing wetlands (aim for systems-manageable lands) (2-6-1), 19.
- bb. Determine how to increase efficiency of dredging equipment to specifically address marsh nourishment (4-2-3), 19.

64. **Technology transfer.** This was identified to be a two-fold problem. First, we lack sufficient communication and technology transfer within the USACE itself, especially within the chain of command. Second, we lack sufficient communication and technology transfer from the USACE to other agencies and the groups with which the USACE works on a day-to-day basis.

- \*a. Improve HEP and Wetland Evaluation Technique (WET) analyses, and relate refined techniques to wetland restoration and development (5-3-1), 22.
- \*b. Develop guidance/clarification on use of HEP and WET by USACE offices (6-2-1), 23.
- \*c. Create a procedural matrix for use in designing, building, and monitoring wetland mitigation sites (5-3-1), 22.

- \*d. Establish technical guidelines for both permit applicants and USACE offices to use in developing wetlands for mitigation (design, implementation, evaluation) (8-1-0), 26.
- \*e. Develop a checklist for project managers or wetland developers that considers all natural functions and values (8-1-0), 26.
- \*f. Generate public relations on USACE wetland projects; i.e., video (8-1-0), 26.
- \*g. Develop a guidance manual for incorporating wetland restoration and development into existing O&M and new work projects (8-1-0), 26.
- h. Document wetland restoration and development efforts in a form other than technical reports (0-6-3), 15.
- i. Develop wetland restoration and development training courses tailored to design engineers (3-3-3), 18.
- j. Develop a 1-day traveling seminar to meet with public and private (special interest) groups to generate understanding of wetlands restoration and development and management (3-3-3), 18.
- k. Consolidate information on sources of plant materials, propagules, planting techniques, and seed bed preparation (2-3-4), 16.
- l. Develop user-friendly computer products for wetland managers, planners, and engineers (3-2-4), 17.

**65. Demonstrations.** Numerous possibilities for wetlands demonstrations in various Districts were identified by project or by site name. However, the goal of this topic area was to identify wetlands types where there are demonstration needs.

- \*a. Develop guidelines and demonstrate wetland restoration and development of wooded wetlands (6-2-1), 23.
- \*b. Demonstrate wetland restoration through removal of fill or abnormal sedimentation, breaching of dikes, and reclamation of farmland (8-1-0), 26.
- c. Regional (no vote)—Demonstrate successful estuarine west coast marsh (seagrass) development.
- d. Regional (no vote)—Demonstrate eelgrass development in anoxic sediments (need techniques).
- e. Regional (no vote)—Develop guidelines for wetland restoration and rehabilitation in arctic and subarctic regions.
- f. Regional (no vote)—Develop guidelines and demonstrations for vernal pools.
- g. Regional (no vote)—Develop guidelines and demonstrations for tropical forests and wetlands.
- h. Regional (no vote)—Develop guidelines and demonstrations in riparian areas.

- i. Regional (no vote)—Develop guidelines and demonstrations in prairie marshes and wet meadows.
- j. Regional (no vote)—Develop guidelines and demonstrations in coastal erosion and subsidence areas.
- k. Use wetlands demonstrations as a means of water purification from storm water runoff, wastewater treatment, non-point source pollution, and mining effluent (4-1-4), 18.
- l. Demonstrate and develop guidance for designing or converting borrow pits into good wetland habitats (2-3-4), 16.
- m. Demonstrate techniques for revegetation of abandoned industrial sites, including strip mines (2-4-3), 17.

## **Minimizing Impacts on Wetlands**

66. The Technical Breakout Session, Minimizing Impacts on Wetlands, consisted of District representatives from five Planning and three Operations offices. Members of the working group were Don Robey (facilitator), Bob Whiting (recorder), Tim George, Brian Lightcap, Sue Hawes, Davis Findley, Bob Will, Neal Johnson, and John Furry.

67. The initial session was devoted to identifying issues and concerns. Twenty-one items were identified in this category. Other needs were grouped into: (a) new technology (8 items), (b) existing technology (16 items), (c) information transfer (7 items), (d) new knowledge and understanding (9 items), and (e) communication (8 items). Forty-eight items were identified in this category. Only District/Division representatives were given the opportunity to identify needs and to vote on priorities.

68. The group did not give any of the non-policy items very high votes, probably as a result of voting District rather than national priorities, and the group's greater concern about policy issues. The group did not combine needs into more general categories for summary purposes at the end of the breakout sessions. Instead, the top five policy issues and top 10 technical/technology needs based on ranking were presented at the workshop summary session. Items that received high rankings are noted by an asterisk. Although items are grouped by category, many of them were identified as falling into more than one category.

### **Policy issues**

69. As with other breakout groups, policy needs identified here by field participants actually refer to requests for Headquarters, US Army Corps of Engineers (HQUSACE) and District/Division administrative and managerial guidance and more flexibility in working across elements within Districts. The group, if allowed, would have been content to spend the total workshop on issues. The following five paragraphs gives the highest rated policy-type issues.

70. **National Environmental Policy Act (NEPA) should be included in general design memoranda (GDMs).** Policy guidance is needed to insure that environmental considerations in the NEPA documentation are reflected in GDMs and plans and specifications. The USACE needs to insure that environmental considerations/special conditions are implemented as developed in the permit or NEPA document.

71. **Wetland protection and floodplain management.** Stronger guidance on wetland protection and floodplain management is needed. This could be achieved by revision of existing Executive Orders 11990 and 11988, or by USACE implementing new guidance on the existing executive orders.

72. **Field review of new guidance.** Field elements need to review any new regulatory or civil works guidance before a draft is approved. Once guidance is finalized, Division-wide forums for working-level employees are needed to allow for consistent interpretation.

73. **Environmental guidance from planners.** Newly developed environmental guidance for planners needs to be distributed to all District elements at the working level. Often, District personnel do not become aware of latest guidance until well after it has been issued from HQUSACE.

74. **Special area management plans and Section 404c.** New USACE guidance is needed on the initiation and implementation of Special Area Management Plans (SAMPs) and the 404c advanced resource identification policies to develop resource management plans that address cumulative impacts.

#### **Technical and technology transfer needs**

75. Most of the technical needs identified by the group in this topic area referred to the acquisition of information and data, providing this information to both USACE and interested agencies and groups, and assessment of procedures. The 10 highest ranked technical items are as follows.

- a. Develop step-by-step procedures to assure minimization of wetland impacts.
- b. Develop new cumulative impact analysis technology to assess how much wetland loss is tolerable now and in the future.
- c. Develop a marketing strategy for new techniques to assist in communication and information transfer.
- d. Develop "how-to" procedures for permit applicants to use to minimize impacts.
- e. Develop internal accounting procedures in both regulatory and civil works activities in order to determine cumulative impacts.
- f. Develop performance criteria, survey and monitoring techniques, and better understanding of wetland functions to determine whether created wetlands function similarly to natural wetlands.
- g. Develop a better wetland impact methodology that includes modeling and other tools to evaluate wetland impacts; i.e., a program similar to Wetland Evaluation Technique (WET).
- h. Increase knowledge of the interaction between wetlands and uplands, possibly using regionalized techniques.
- i. Increase understanding of wetland functions and values related to small isolated wetlands within geographic regions.
- j. Develop a trade-off methodology for deciding between different wetland replacement types, possibly using regionalized techniques.

#### **Remaining items of discussion**

76. All items with an asterisk were recognized by the group as high priorities. During early breakout discussions, five possible categories, previously described, were identified. Items are listed under these general categories.

**a. Improved policy guidance**

- \*(1) Provision for feedback from the field before any "new" guidance is finalized (field review's reevaluation after it is put out on the street).
- (2) At what point do you consider minimizing impacts? Sequence? Specific guidance is necessary at the field level to allow consistent application by functional elements.
- \*(3) Incorporation of all functional elements into policy guidance and its formulation. Needs to reach working level.
- (4) Precise guidance for incorporation of non-monetary benefits (i.e., minimizing impacts). How do we consider the costs of minimizing?
- (5) Establishment of "life cycle" interdisciplinary teams within Districts beyond NEPA?
- (6) Minimization of impacts on wetlands during operations and maintenance activities, including clarification of opportunities and policies.
- (7) Guidance on interaction with sister Federal agencies.
- (8) Minimization needs dollars to implement.
- (9) Policy guidance on monitoring and compensation.
- \*(10) Policy guidance to insure that environmental considerations are actually incorporated during construction.
- (11) Consistent guidance regarding avoidance versus on-site compensation (which is most important?)
- (12) Should we regionalize 404b guidance?
- (13) "Liberalization" of the Federal standard to minimize impacts on wetlands and create beneficial use opportunities.
- (14) Reevaluate policy of not mitigating for impacts due to periodic maintenance.
- \*(15) Revise USACE SAMPs and 404c advance resource identification policies to allow USACE to initiate and implement resource management plans to address cumulative impacts.
- (16) Determine where USACE is going on avoidance versus mitigation, and whether the US Environmental Protection Agency's sequenced approach should be adopted.
- (17) Determine whether 404 violations should receive after-the-fact authorization not in compliance with the 404b1 guidelines.
- \*(18) Determine whether compliance inspections for regulatory and civil works projects are carried out (concern over shortages in dollars and manpower).

- (19) Determine economic feasibility of alternatives giving logistics, costs, etc. (training needed)
- \*(20) Strengthen Executive Orders 11990 and 11988 (wetlands, floodplains).
- (21) Integrate floodplain management into civil works activities.

**b. New technology**

- \*(1) Conduct cumulative impact analysis (How much loss is tolerable now and in the future)?
- (2) Fill data gaps on effects of navigation on adjacent wetlands (may be being done elsewhere).
- \*(3) Develop accounting procedure for keeping track of cumulative impacts for permits and civil works.
- \*(4) Determine techniques needed to determine quantity and quality criteria for determining replacement wetlands (criteria for success).
- (5) Impacts of vegetation under high velocity and sheet flow conditions.
- (6) Develop a shell for modeling wetland impacts (bag of tools).
- (7) Impact methods: accounting system, prediction.
- (8) Develop hydrologic tool to evaluate wetlands in relationship to floodplain management.

**c. Refine existing technology**

- (1) Refine WET for consistent results among users.
- (2) Improve procedures for incorporation of environmental considerations in channelization projects; i.e., cross sections, alignment, etc.
- (3) Examine sediment, chemical/biological, interactive effects to determine if wetland loss can be minimized by alternative water level management.
- (4) Develop guidance on what vegetation can be permitted to grow on levees.
- (5) Develop techniques for wetlands management on USACE or mitigation lands.
- (6) Determine interaction of benthos (nursery, nutrients) in wetlands and adjacent waters in all areas of USACE activities.
- \*(7) Determine whether created wetlands function naturally (survey and monitoring techniques—better understanding of differences).
- (8) Optimize levee heights to maximize beneficial effects to wetlands.
- (9) Increase understanding of wetland hydrologic retention—flood control benefits.

- (10) Reevaluate guide specifications on clearing and snagging and construction activities.
- (11) Determine effect of wetland creation as affected by sea level rises.
- (12) Develop techniques to understand causes and minimize adverse impacts, i.e., shoreline erosion, interruption of sheet flow.
- (13) Consider groundwater recharge/discharge effects in regulatory and civil works activities.
- (14) Standardize assessment techniques in how-to documents for analytical methods (national inventory), i.e., surveys and monitoring.
- (15) Determine relationship of transition zones to wetland values and functions (width of buffer zones, etc.)

**d. Information transfer**

- (1) Increase training on how to run and manage SAMPs and WET in various geographic areas.
- \* (2) Provide permit applicants with "how-to procedures" to minimize impacts. Develop manual as a step-by-step guide, etc.
- (3) Synthesize information nationally to support above concept and for everyday use in project planning.
- (4) Obtain US Army Engineer Waterways Experiment Station assistance in providing regionalized information case studies with examples for region.
- (5) Develop video and graphic aids to supplement District efforts to explain cumulative impacts to the public. These are also needed for use in developing local and regional strategies to minimize impacts.
- (6) Share USACE expertise with other agencies through Section 22, etc.
- (7) Increase understanding of shallow lake wetland interaction with water quality and biological dependency.

**e. New knowledge and understanding needed**

- (1) Increase knowledge of terrestrial wetland interactions.
- (2) Increase knowledge of in-stream flow needs as related to permit jurisdiction and low-flow analysis.
- (3) Develop important submerged aquatic vegetation species profiles for life cycle requirements (e.g., *Vallisneria*).
- (4) Increase knowledge on small wetlands functions and values, particularly remnants in agricultural areas and intact systems.
- (5) Determine the effects of mud waves on wetlands and how to control or avoid them.



- (6) Increase understanding of effects of clear-cutting of bottomland hardwoods on wetland functions and values.
- (7) Develop knowledge to allow a more holistic management approach to wetlands management versus a single-purpose goal.
- (8) Determine causes of impacts of sedimentation in riverine wetland systems.
- (9) Determine whether in-kind or out-of-kind replacement between wetland types is acceptable. If so, determine how these tradeoffs can be evaluated.

**f. Communication**

- (1) Develop a marketing strategy for new techniques.
- \*(2) Develop better step-by-step training for new employees.
- \*(3) Support the HQUSACE initiative to direct Operations to look for ways of minimizing impacts at existing projects.
- (4) Develop formal procedures to allow sharing of information between Districts.
- (5) Develop written strategies for educating the public.
- (6) Increase understanding of the use of wetlands as buffer treatments to improve water quality.
- (7) Increase understanding of hydrologic cycles in determination of wetland types and succession (mountain meadows, etc.).
- (8) Eliminate ignorance regarding relationships between surface water and groundwater.

## Wetlands Change Assessment Techniques

77. The Technical Breakout Session, Wetlands Change Assessment Techniques, had a more focused topic area than groups 1 through 3. There was some discussion of policy-related items at the outset, similar to that for the opening plenary session. There was a strong tie between this group and group 1 on wetland values, because wetland values and functions of some sort would be the most appropriate parameters for measurement of changes.

78. The group originally consisted of Mike Palermo (facilitator), Jack Stoll (recorder), Darryl Calkins, Jerry Willey, Steve Walls, Morris Mauney, Rick Harlacher, and Monte Pearson. On September 14, these people were joined by members of the breakout group on regional wetlands, who had concluded their work on September 13. Those group members were Steve Eggers, John Rogner, Dan Martel, Joe Hughes, Ed Bonner, Sheryl Carruba, and Jim Chandler. Therefore, group members from regional wetlands listed items and participated in the vote in both breakout groups.

79. Two general approaches to assessing change were discussed: (a) remote sensing approaches applicable in evaluating large areas and utilizing a mapping approach for data presentation, and (b) field observation approaches which involve personnel on the ground evaluating monitoring stations or small areas. There may be some overlap between these two general approaches, and there would definitely be some tie between the approaches in many cases to permit correction and interpretation of remote data; e.g., ground truthing.

80. The most important concerns or needs identified by this working group were the selection of appropriate parameters for any monitoring effort and the establishment of a working definition of change. Many of the detailed items of discussion centered around Geographic Information Systems (GIS's) and their use in assessing wetlands changes. Standards for GIS data preparation and entry and compatibility of GIS datafile formats were identified as needs.

### Items identified, discussed, and scored

81. A total of 21 needs and concerns were identified by field representatives, discussed, and ranked in this working group. Only individuals from field offices participated in the ranking procedure. A brief description of each of the 21 items, listed in the order of their score (ranking) follows. Categories of new technology, refinement of existing technology, and technology transfer were used by the group; however, most items crossed over into all three categories (see table following listing of items).

82. **Identify appropriate parameters for assessing wetland changes.** This item involves a winnowing process from a larger group of parameters identified as important with respect to wetland functions and values. Not all the desired parameters could be economically or effectively monitored; many parameters may be specific to certain habitats or wetland types or certain functions and values of a given wetland. There may be separate parameters selected for short-term and long-term monitoring or for remote sensing and field observation approaches. Any selection of parameters for monitoring

must be compatible with predictive models or techniques that might be used to evaluate potential changes.

**83. Establish standards for data collection.** Standards should be established for the degree of refinement, accuracy, or precision of data collected; e.g., 1-ft contour intervals versus 0.1-ft contour intervals. The smallest area for which parameters will be defined is important (e.g., grid cell size). These standards may vary according to the parameter and according to the approach used for data collection.

**84. Customize change assessment techniques to meet regional needs.** The parameters selected for monitoring, the standards for data collection, etc., should be examined on a regional basis. "Regional" may be defined for this purpose as by US Army Corps of Engineers (USACE) District, wetland type, watershed, etc. For example, remote sensing approaches with a lesser level of detail may be appropriate for large wetland areas like arctic tundra, but entirely inadequate for small wetland areas.

**85. Identify and assess on-site and off-site trends and factors that affect wetlands.** In assessing wetlands changes, information regarding the areas and activities surrounding the wetland must be considered. Appropriate trends and factors regarding land use surrounding the wetland must be defined and their change assessed in concert with changes within the wetland areas. Examples of such activities might include clearing and development of upstream areas or fragmentation of wetlands by roadway construction.

**86. Update and refine National Wetlands Inventory (NWI) using standard Federal definition of wetlands.** This item related to resolving wetland questions on changes or habitat losses. The utility of the NWI is generally considered limited because of the definition of wetland used in developing the maps. Now that a Federal delineation manual has been adopted, the NWI should be refined and updated using the new Federal definition.

**87. Extend the NWI to include wetland functions and values.** The NWI is presently limited to delineation of wetlands, even if updated and refined as described above. To adequately examine wetlands in light of the "no net loss" policy, an extension of the inventory to wetlands functions and values is necessary.

**88. Determine needs for GIS compatibility.** Different GIS packages must be able to exchange data files. This is important with respect to systems being used by Districts and by other state and Federal agencies. The needs for and methods to insure appropriate levels of compatibility should be determined and implemented.

**89. Define what constitutes a change in values or functions.** A definition of change for each parameter monitored must be established. For comparison with analysis results, change definition may be resolved with threshold values or ranges of numerical values to define magnitude of change. This may provide a basis for discriminating natural successional changes and forced changes, and whether these changes are of short- or long-term duration. Magnitudes of change also will vary in importance with respect to wetland type and regional distribution.

**90. Evaluate feasibility of using multi-spectral imagery for assessing wetlands changes.** In general, the types of remote sensing used in wetlands assessment have been limited to manual interpretation of black and white, color, and color infrared aerial photography, and single band or color composites of imagery. The advantages of digital multi-spectral imagery in the visible infrared and thermal regions of the spectrum should be investigated. Applications of multi-spectral imagery have been successful in mapping wetlands and land use for resource inventories and flood control planning.

**91. Establish standards for GIS data preparation and entry.** GIS technology is considered to have high potential for assessing wetland changes. However, there are many technical issues associated with efficient use of GIS's. The acquisition, preparation, and entry of data into a GIS is the most resource-intensive phase. Standards are necessary for the preparation and entry of data for GIS's.

**92. Define compatibility of assessment techniques with other USACE needs.** Any system selected to assess wetland changes using a remote sensing approach should be applicable to supporting information needs for other District functions. This prerequisite is especially important for expensive techniques such as GIS's. For example, any GIS system used for wetland purposes should be used for basic mapping applications throughout the District.

**93. Determine short- and long-term frequency of data collection.** The frequency of data collection must be established for both short- and long-term change assessment. For example, how often must imagery be obtained for remote sensing approaches to establish change? Or how often must field observation stations be visited for data collection?

**94. Develop a database of information sources for change assessment.** Sources of data which would be useful in assessing wetlands changes exist both within and outside USACE. All these sources should be identified and integrated into a database for wetland change assessment. This database could be a part of an overall GIS system. For example, mapping done for planning or design of specific projects could supplement efforts for wetland assessment. State and local agency mapping also should be identified.

**95. Develop field identifiers and/or manuals for assessing wetlands changes.** Technicians are usually the first in the field at a given location and do the most on-site field observation. They should be given field manuals, color charts, photos, or other easy-to-use aids to identify local changes in functions and values.

**96. Develop identifiers for remote sensing for assessing wetlands changes.** This is a companion item to that above. Appropriate identifiers for remotely sensed imagery to assess the desired changes in wetlands should be developed. This type of guidance is needed to assist users in the interpretation of imagery for wetlands changes.

**97. Develop guidelines for selecting and applying GIS hardware and software.** Even though there are approximately 65 GIS systems available in the US for use by USACE, many Districts have not yet purchased a GIS. Some guidelines for selection of

hardware and software should be developed to aid the Districts in selecting a GIS to suit their needs and to ensure the most efficient use possible District-wide. This guidance should include advantages and disadvantages of the various types of GIS on the market.

**98. Develop techniques for the use of airborne video imagery for expedient change assessment.** Video imagery in lieu of conventional aerial photography is considered a faster and less expensive technique to obtain good quality data. It is possible with customized lenses and filters to use video cameras as hyper-spectral systems for detecting very specific attributes. Techniques for use of video in both aerial and field applications should be developed.

**99. Develop techniques to measure small changes in wetlands hydrology.** Hydrology is the parameter that most affects changes in wetlands soils and vegetation. To anticipate later changes, an early indication of change in wetlands hydrology is critical. However, there is often a lack of useful data to assess hydrology, especially the small changes that can occur due to changes in channel obstructions or in surrounding land uses. The use of expedient stream gages and similar techniques should be investigated.

**100. Define general goals and trends for assessing wetlands changes.** This item borders on a policy question: Where does USACE want to go with respect to wetlands stewardship, wetlands protection, mitigation for losses, and no net loss? Those goals and appropriate long-term trends need to be monitored. USACE goals should then be integrated with those of other agencies.

**101. Assess modeling as a technique for prediction of change.** Assuming that techniques can be used to establish changes which have occurred, the next logical step is to predict future change. Appropriate models should be investigated for use in making such predictions.

**102. Develop criteria for use of historic data in assessing change.** In the context of wetland losses, USACE must have an idea as to what time period will be used as the starting point or baseline. However, the older the data, the lower the quality and level of detail. Standards for use of historic data such as mapping information must be established before such data can be used in defining long-term trends.

**103. Scoring of items.** The group set a high trend in their scoring of the items identified. Only one item received the lowest score of 15. The remaining 20 items were scored at 19 or greater. The top 10 received scores of 22 or greater out of a possible 30, indicating each as a high priority need. Relatively high rankings were given for national applications and low rankings tended to be given for more local applications; e.g., regional application rankings were generally low, with scores of 4 or less except for item 3, which received a score of 8. Item 3 specifically addresses monitoring and data collection on a regional basis. Most items reflected both new technology needs and the refinement of existing technology. Items are listed in order of ranking as a result of votes.

Item	Reference (a - u)	Score	Application**			Need†		
			N	R	L	N	R	L
1	(a)	30	8	2	0	5	5	0
2	(b)	25	9	1	0	4	4	2
3	(c)	25	2	8	0	4	5	1
4	(d)	25	7	2	1	3	5	2
5	(e)	24	10	0	0	1	9	0
6	(f)	24	8	0	0	6	4	0
7	(g)	24	10	0	0	4	3	3
8	(h)	23	7	2	1	7	3	0
9	(i)	22	10	0	0	8	2	0
10	(j)	22	5	4	1	4	4	2
11	(k)	21	6	2	2	2	5	3
12	(l)	21	5	4	1	5	4	1
13	(m)	21	6	3	1	1	2	7
14	(n)	21	3	4	3	8	2	0
15	(o)	21	5	4	1	5	5	0
16	(p)	21	10	0	0	2	6	2
17	(q)	20	4	4	2	6	3	1
18	(r)	20	2	4	4	5	5	0
19	(s)	19	10	0	0	7	3	0
20	(t)	19	8	1	1	6	4	0
21	(u)	15	5	4	1	6	3	1

\* Score: Votes were based on high priority = 1, medium = 2, and low = 3. Only the field representatives were allowed to vote on the items. There were 10 field reps, therefore a perfect score is 30.

\*\* Application: N = national application, R = regional, and L = local.

† Need: N = new technology, R = refinement of existing technology, and T = technology transfer.

## **Wetlands Stewardship and Management**

104. Members of the Technical Breakout Session, Wetlands Stewardship and Management, focused on information needed to guide wetlands restoration, development, conservation, and management on USACE-administered properties. They also considered information needed to help ensure success of joint venture activities with other agencies, such as the US Fish and Wildlife Service. The session members consisted of Carl Brown (facilitator), Dick Lenning (recorder), Dan Erickson, Mike Fowles, Pete Milam, Van Shipley, Gary Swenson, and John Zammit.

105. The session members identified 29 information needs considered to be of interest to USACE project managers and planners across the nation. The needs (items) were divided into four categories: (a) information transfer, (b) technology and data acquisition, (c) policy and guidelines, and (d) coordination. While session members considered all of the information needs identified as important, each item received a rating of high, medium, or low to show its relative importance (priority) among the total 29 needs. The session members rated 14 items as having "high" priority. Of these, six related to information transfer, three to technology and data acquisition, four to policy and guidance, and one to coordination with others.

### **Information transfer**

106. Much information on wetlands development, restoration and management exists; however, this information is in diverse sources that are not readily available to the managers of USACE projects. If the personnel at each District or each project must search out this information on their own, there will be duplication of effort, as well as an inordinate investment of personnel time. The session members recommend that HQUSACE or a laboratory collect, collate, and distribute existing information to USACE field offices. The top information needs in this category are (item numbers correspond with those in paragraph 109):

- a. Identification of existing sources of technical information and expertise (Item 1).
- b. A "cookbook" (manual) of economically and environmentally feasible engineering and biotechnical methods for restoring, developing, and managing wetlands (Item 2).
- c. Compendium of wetlands guidance and regulations (Item 3).
- d. Regional lists of plants that will likely succeed in restoration or development activities (Item 4).
- e. Training for resource managers and planners similar to that being provided now for regulators (Item 5).
- f. Guidance on functional size in developing wetlands. What's too large? What's too small? (Item 6).

### **Technology and data acquisition**

107. Although information exists about the items identified by the session members, the information needs to be tailored for application on USACE projects and similar Federal lands and waters. Top needs in this category are (these numbers correspond to those in paragraph 109):

- a. Methodology for determining quality, functions, and values of wetlands on local, regional, and national scales. (Item 9).
- b. Methodology to readily identify sites with good to high potential for wetlands development/restoration (Item 10).
- c. Guidance on use of wetlands to reduce pollution (Item 11).

### **Policy and guidance**

108. Items identified in this category ask for formal statements (Engineer Regulations, etc.) that establish clear ground rules for a stewardship program. Regulations and guidance from HQUSACE provide strength and nationwide consistency to ongoing USACE project management programs. Such guidance assures the field that there is HQUSACE support for activities at the field level, provides the basis for commitment of funding and personnel resources to accomplish program-related tasks, and lets other agencies and the public know that the USACE programs are structured and implemented with public benefits in mind. The session members recommend that appropriate regulations be modified (or new ones developed) to recognize the new wetlands initiative and to define what HQUSACE and the ASA(CW) consider appropriate activities under the stewardship concept. The top items in this category are (item numbers correspond to those listed under "Items identified and discussed" below):

- a. Support for a wetlands stewardship program on Federal lands that includes wetlands restoration and development as management techniques allowable at full Federal expense (Item 20).
- b. Support for parity between wetlands management and other project purposes (Item 21).
- c. Support for funding and personnel to ensure that the program moves forward (Item 22).
- d. Guidance to ensure that all pertinent parties in USACE are "listening to the drumbeat" of the wetlands initiative (Item 23).

### **Coordination**

109. As the wetlands initiative moves forward, USACE must coordinate closely with many agencies, including FWS, the US Environmental Protection Agency, Soil Conservation Service (SCS), and the individual states. A current pressing need is to work closely with the FWS to determine the role/significance of wetlands on USACE projects to waterfowl, in support of the North American Waterfowl Management Plan (Item 29).



## **Items identified and discussed**

110. The session members rated 14 information needs of top concern, but all 29 needs are important. The 29 needs are listed below by category and rating. For ease of reference, the needs are numbered consecutively, regardless of category. Asterisks identify the items with highest ranking.

### **a. Information transfer**

- \* (1) Develop a handbook that identifies existing sources of information and expertise for wetlands management, including information on techniques others have used successfully.
- \* (2) Develop a "cookbook" of economically and environmentally feasible engineering and biotechnical methods for restoring, developing, and managing wetlands.
- \* (3) Develop a compendium of wetlands guidance and regulations.
- \* (4) Develop regional lists of plant and animal species for wetlands development, restoration, and management.
- \* (5) Conduct training in wetlands management for field personnel (planners, resource managers) similar to that being provided for regulatory personnel.
- \* (6) Develop guidance on functional size in developing wetlands (What's too small? What's too large?).
- (7) Develop a GIS system common to USACE offices and other key agencies (FWS, SCS, etc.) In order to be able to share information readily (medium).
- (8) Identify specialized equipment appropriate for construction or management of wetlands (low).

### **b. Technology and data acquisition**

- \* (9) Develop a methodology for determining quality, function, and value of wetlands on local, regional, and national scales.
- \* (10) Develop a methodology to readily identify wetlands sites with good to high potential for development.
- \* (11) Develop guidance for the use of wetlands as a tool for pollution reduction.
- (12) Develop a methodology for identifying historic baseline in wetlands (for use in restoring wetlands) (medium).
- (13) Develop a methodology for determining the impacts of pollutants on wetlands communities (medium).

- (14) Develop a methodology for determining environmental impacts wetlands developments will have on existing vegetation, hydrology, and soil conservation programs on Federal lands (medium).
- (15) Develop a methodology/strategy for managing wetlands in urban areas so they will be aesthetically compatible and vector problems will be minimized (low).
- (16) Develop techniques for dealing with exotic plants in wetlands. In several areas of the country, exotic plants have displaced or are displacing native wetlands and aquatic species. Usually, eradication of such exotic plants is not feasible. So there is a need for management techniques that permit maintenance of such plants at beneficial levels within the ecosystem (low).
- (17) Develop a methodology for determining/predicting effects of offsite (outside USACE project boundaries) developments on wetlands (low).
- (18) Develop a methodology for predicting impacts of O&M activities on wetlands (low).
- (19) Develop a methodology for measuring historic rates of change in wetlands and for predicting future rates of change (low).

**c. Policy and guidelines**

- \*(20) Develop guidance supporting a wetlands stewardship program on Federal lands that includes wetlands restoration and development as management techniques allowable at full Federal expense.
- \*(21) Develop guidance supporting parity between wetlands stewardship and other project purposes.
- \*(22) Develop guidance supporting funding and personnel for inventories of:
  - i. Wetlands.
  - ii. Hydric soils.
  - iii. Wetlands-associated plant and animal species of special concern.
  - iv. Wetlands-associated rare and endangered habitat types.
- \*(23) Develop guidance to ensure that all elements of the USACE (Commanders, Planning, Engineering, Operations, Real Estate, Research and Development hearing the same drumbeat with regard to wetlands initiatives. Successful stewardship requires a team effort.
- (24) Identify partnerships USACE may use to accomplish wetlands stewardship and management (medium).

- (25) Develop guidance on whether restoration and development of wetlands on Federal lands may be considered banking, and may be funded (or partially funded) by entities requesting permits or by people penalized for violating permits (medium).
- (26) Develop guidance on how the Food Securities Act of 1985 (Sodbuster/Swampbuster Act) applies to USACE activities, especially as it relates to agricultural leases (low).
- (27) Need support for "routine" use of dredged material to create, restore, or improve wetlands (low).
- (28) Need cost-sharing rules for development in outgranted areas (low).

**d. Coordination with others**

- \* (29) Determine the role/significance to waterfowl of wetlands on USACE projects to waterfowl, in support of the North American Waterfowl Management Plan.

111. Members of the Wetlands Stewardship and Management Breakout Session recommend that accommodating the information needs listed is necessary for achieving efficient and effective stewardship of wetlands on USACE-administered properties. The session members view the statement of needs as reasonable in scope and, considering the potential utility of the information at over 460 projects on USACE-administered land, predict that the needs can be accommodated with a reasonable level of personnel effort and funding.

**The Role/Status/Importance of Wetlands on a Regional Basis**

112. The Technical Breakout Session, Role/Status/Importance of Wetlands on a Regional Basis, had as its objective to discuss issues, problems, and needs that exist in the field pertaining to USACE responsibility towards regional wetlands. Only three items were identified and discussed, and this working group concluded its work on September 13. On September 14, they joined the breakout session on change assessment techniques. Group members consisted of Ed Theriot (facilitator), Tom Hart (recorder), Steve Eggers, John Rogner, Dan Martel, Joe Hughes, Ed Bonner, Sheryl Carruba, and Jim Chandler.

113. Most of the District/Division representatives assigned to this group did not have experience in dealing with wetlands on a regional basis. Unlike other groups, this group was asked to address issues, problems, and needs on a broader plane than had previously concerned US Army Corps of Engineers; i.e., delineation, evaluation, restoration, cumulative impacts, and natural resources. As a result, the topic was referred back to Headquarters (HQ), USACE to expand and clarify, and only three items are listed.

114. HQUSACE must provide definite and specific policy statements and/or regulations that require field offices to examine wetlands from a regional standpoint. An ex-

ample would be the General Distribution policy letter sent in December 1986 by General Hatch, then-Director for Civil Works, strongly encouraging the development of long-term management strategies for dredging regions, including regional approaches to the beneficial uses of dredged material (which includes wetland restoration and development using dredged material).

115. A Geographic Information System (GIS) standard for use by USACE Districts and Federal and state resources agencies must be agreed upon to allow compatibility and better communication on regional wetlands changes in quantity and quality.

116. Coordination and agreement with Federal and state resource agencies on mutual definitions and goals in a national wetlands policy should be sought.

**CLOSING PLENARY SESSION**



## CLOSING PLENARY SESSION

117. Technical Breakout Session facilitators presented findings of their groups, which summarized the preceding information of this miscellaneous paper. Closing comments were made by Headquarters, US Army Corps of Engineers staff, who had been rotating between sessions and observing workshop activities. Comments were taken from the workshop tapes as follows.

### Dr. Klesch

118. I was asked to wrap up our workshop, and I will ask Jess Pfeiffer and Russ Theriot if they would also say a few words. I, along with Mary Landin and the other people from the US Army Engineer Waterways Experiment Station (WES), want to express our deep gratitude to you for your time and effort here. It is a tribute to the expertise and experience we have in USACE that we were able to put together and have a workshop like this, with such good results.

119. You have given me a whole suite of ideas that I promise I will take back and use in any way we can in policy development. In policy, the train moves rather quickly, and it is very infrequently that we have an opportunity for field input before we push ahead too far. In hindsight, we would have liked to move quicker on this, but ASA(CW) was telling us not to get ahead of the Administration and the President's task force on wetlands. I personally was disappointed about the lack of speed at first, but if we had been allowed to move ahead as fast as we wanted to, this workshop would not have happened. As it is, we have been able to get your ideas and hear your problems. We will use them to formulate our overall wetlands policy and tailor the wetlands Research and Development program.

120. As we met over the past 2 days, several things struck me. One was the real need for communication, not only with other folks but among ourselves in USACE. The comment about eliminating 'stovepiping' in one of the breakout groups comes to mind. Stovepiping by the USACE is an effective way to carry out various aspects of our projects. On the other hand, it allows for a huge lack of communication between offices within our Districts; i.e., when Planning, Engineering, and Operations do their individual parts of a project, but don't talk to each other. We hope to improve the coordination among those offices, and that is part of our job in the Office of Environmental Policy. We cross all element boundaries, and we hope to work with all of them. We realize that we may get some resentment, but it is essential that we work across offices to get everybody working as a team. On the same note, I hope you will do the same within your own District. We need to talk to each other. A good step in the right direction is the interaction we have here, with engineers, biologists, planners, regulators, resource managers, all here talking about wetlands and formulating ideas and suggesting changes. We are all part of the same USACE team, and we all ought to be working toward common goals.

121. Another item that really struck me was the amount of discussion on high-tech application in breakout groups. Geographic Information Systems (GIS's) and computer software improvements and developments came up in every group. GIS is a subject very near and dear to my heart. I just finished a 1-year assignment for General Hatch as his special assistant for GIS, looking at USACE's GIS capabilities, needs, and potential. A final report will be distributed as soon as possible, and in fact, is in my office now, ready to be mailed. If you don't have a GIS system in your District, I highly recommend you go through this report. There is a lot of good information, but some of the most important is a listing of all GIS's that exist in USACE, including the laboratories, with a point of contact and telephone number.

122. Those of you who want to use a GIS need to talk to those who have a GIS in place. Define your needs, and don't get too excited about the GIS salesmen and vendors' pitches. Know what you need first, then look up the company that sells it. A GIS is nothing more than a tool, and you need to approach it that way—just like your telephone or your personal computer. It is supposed to help you do your job, so be careful as you assess its application to your own problems. Costs are coming down dramatically, and there are over 65 separate GIS packages for sale today in the United States alone.

123. GIS costs range from about \$1,000 to over \$80,000, so which one should you choose? A word of caution, GIS is excellent technology, but the data costs to run your GIS are probably going to be equal to or higher (cost as much or more) than the cost of the GIS package itself. If you are worried about software and hardware costs, you had better reconsider your needs, because data acquisition costs will completely wipe you out. Our local sponsors (city, state, ports, etc.) are very interested in GIS's and are acquiring and using them. We as an agency generally use data from other sources. Information generated at other sources and stored in their GIS could potentially be used by us if we have compatible systems. Local sponsors are also looking at their GIS and the data contained therein as part of their 'in-kind services' associated with their cost-sharing responsibilities.

124. Be cautious, and call people using a GIS. Southwestern Division, particularly Fort Worth District, is the premier Division using a GIS right now. The Detroit, Portland, Rock Island, and Little Rock Districts are others who have operating systems. Call them or call us. There were 32 people from HQUSACE, the laboratories, and the field on our ad hoc GIS committee, and they represent the bulk of GIS expertise in USACE. Contact them if you have any questions.

125. I have heard some good suggestions for GIS applications here this week. For example, if you could digitize the National Wetlands Inventory data, you could put that into a GIS. Much of the data you need for cumulative impacts and wetlands change assessment lends itself to GIS use. These types of suggestions on applications will further the use of GIS within the USACE and I, for one, would encourage these forums.

126. Again, I appreciate your taking time away from your offices to help us here. We have a long way to go, but you have definitely given us a good beginning. The



intent is to produce a draft, and get it back to participants for review and additional comments. Mary (Landin) plans to have these proceedings in a draft and back to you in a few weeks.

**Mr. Pfeiffer**

127. I too want to thank you very, very much for your essential input. To build a great building, we have to have a good foundation. The good foundation is what this workshop is all about. Without a good foundation, that great building would be in trouble from its start. I've been around long enough to see the development of several USACE research and development (R&D) programs, and I can tell you that you have given us excellent ideas and comments. I thank you for that, and for your enthusiasm and desire to make this work.

128. As I mentioned earlier, we will get this back to you as soon as possible. We are on a tight schedule and we welcome your additional input. We will establish a Wetland Research Program field review group. This will be done in the months ahead.

129. One of the questions that kept coming up was how we were going to do all we needed to do in only 3 years. Well, the answer is, we can't. We will do all we can, but some work by its very nature can't be finished in 3 years. For example, a large demonstration wetland needing 5 year's data couldn't be finished. Nature has to take its course, and I don't care if you throw millions of dollars at it, biological processes can't be hurried.

130. How do we handle that? Two ways. First, if we do good enough work and produce good products in 3 years, we may get a Wetlands II. We are laying the groundwork for that now. If that does not happen, we do have an on-going, low-level, funded wetlands effort under General Investigation R&D that could carry us over. In this program, we can work on these longer-term wetlands projects. We will also look at regionalization and see how that concept can be put to good use in wetlands changes and other aspects.

131. I wanted to talk about communications, especially day-to-day communications among USACE offices. I mentioned earlier about the possibility of a computer network such as DREDGENET. Do you want to see a WEI NET communication system set up? Let's see a vote (strong show of hands). Okay, we will go ahead and set the system up.

132. Finally, we will use the program manager concept with the Wetlands Research Program. Even though this is a 3-year program, the amount being spent in each year makes it the biggest and the most complex program USACE has ever had. The program manager will be Russ Theriot. Technical managers will be assigned to each of the major work areas later. If you have questions, call Russ, call Mary, Buddy, or Carl, and when they are assigned, find out who these technical managers are, so that you can stay in close communication.

**Mr. Russell F. Theriot**

133. I would also like to add my thanks to all who worked so hard to make this workshop a success—the facilitators and recorders, and especially to Mary, Carl, and Buddy. I know that Mary, for example, worked around the clock to get the survey analyzed last week. We assured success at the workshop by inviting people with ‘can-do’ attitudes. I am confident that we will be successful with the Wetlands Research Program because of the determination and the positive attitude of people in USACE such as yourselves. The constraints put on us in the past 2 weeks by ASA cutting the program from 7 years to 3 years makes this program all the more a challenge. We had to change our focus—not what we hope to accomplish, just how we are going to do it.

134. Don’t expect WES to pull this one off—this is not just a WES show. It is a USACE show, and with your input and HQUSACE fighting for the program, we can get this work done. We want to see good results at the end of the 3 years. You know how hard it is to get contracts let and get work done in such a short time frame. Well, we will be depending upon you and your offices to help out with this and research efforts. I thank you again, and look forward to working with each of you.

**Mr. Michael L. Davis**

135. On behalf of the Regulatory Office, HQUSACE, we appreciate WES doing such a fine job in putting together this effort. It is heartening to me to see that the District Engineers sent their regulators to this workshop. This is a very exciting time to be working for USACE, and we are looking forward to working with you on this program.

**Mr. James Wolcott**

136. From the Natural Resources Office, HQUSACE, I wanted to tell you how much I appreciated the chance to hear what you had to say, and to see all of the teamwork among the various USACE offices represented. I am also enthused over this program and how we can use it to get some good wetlands work accomplished.

**Dr. Klesch**

137. I wanted to close this workshop with a quote from LTG Henry J. Hatch, our Chief of Engineers. Last year, we published a pamphlet entitled ‘Our Vision’ that included USACE’s pledge to the future. I would like to have copies of this mailed out with the draft proceedings. I quote:

*We believe we are the best public engineering agency in the world and are determined to make ourselves better to serve our Nation's needs....We are committed to our people....We are committed to our values....We are committed to our customers and partners....We will seek new ways beyond our current military and civil missions to meet our Army's and our Nation's needs. By selectively seeking new tasks that are fully compatible with and*

*enhance accomplishment of our current missions, we will better serve our customers and prepare ourselves for the future. As our primary targets, we seek a broader role in developing, managing, maintaining, and repairing our Nation's infrastructure; developing, managing, and protecting our water resources; and addressing our national environmental and space challenges.*

138. Thank you for coming and for your help, and have a safe journey home.

APPENDIX A: SURVEY OF CORPS OF ENGINEERS INFORMATION  
NEEDS FOR WETLANDS CONCERNS

## **SURVEY OF CORPS OF ENGINEERS INFORMATION NEEDS FOR WETLANDS CONCERNS**

The US Army Corps of Engineers (USACE) has been responsible for mitigating wetland losses for many years as part of its regulatory and planning responsibilities. However, within the last few years there has been growing concern about wetland losses. The National Wetlands Policy Forum Report, President Bush's emphasis of "... no net loss of wetlands...", and LTG Hatch's vision of the Corps' expanded role in wetlands have prompted USACE to initiate an evaluation of Corps concerns. Some major issues include protection, restoration, creation, and evaluation of wetlands. The first step in this process is to identify Corps concerns and needs. This survey is designed to identify these needs and determine the necessity for further wetland studies. **Your input will be critical in deciding the direction of these future studies.**

The purpose of this survey is to identify and characterize Corps information needs as they pertain to wetland mitigation activities associated with regulatory, operational, and planning requirements. Survey results will be used to identify critical needs, assess the level of information required, and select the best form of information transfer. A workshop will also be held later this year to further examine wetland concerns. Your recommendations and comments will be extremely useful in designing the workshop and aid in the selection of participants.

Please complete this survey by **15 July 1989** and forward to:

Mr. Ellis J. Clairain, Jr.  
US Army Engineer Waterways Experiment Station  
CEWES-ER-W  
PO Box 631  
Vicksburg, MS 39181-0631  
(601) 634-3774

or

Dr. Mary C. Landin  
Same address  
(601) 634-2942

# SURVEY OF CORPS OF ENGINEERS INFORMATION NEEDS FOR WETLANDS CONCERNS

Name (optional): \_\_\_\_\_

Job Title: \_\_\_\_\_

District/Division: \_\_\_\_\_

Division/Branch/Section: \_\_\_\_\_

## Background

1. Some wetland issues which may be examined are listed below. Please rank each issue according to your own District's priority and needs.

- \_\_\_\_\_ Cumulative impacts
- \_\_\_\_\_ Habitat functions
- \_\_\_\_\_ Hydrology functions
- \_\_\_\_\_ Mitigation
- \_\_\_\_\_ Socioeconomic values
- \_\_\_\_\_ Water quality functions

2. What types of construction/developmental activities are most commonly proposed in wetland permit applications and Civil Works projects in your office? (Please give approximate proportions of each activity.)

	Civil
Permits	Works
_____	_____ Highway and road construction and improvements
_____	_____ Urban and commercial construction and expansion
_____	_____ Marinas
_____	_____ Bulkheads and piers
_____	_____ Farming practices
_____	_____ Forestry practices
_____	_____ Sand, gravel, and coal mining
_____	_____ Military activities
_____	_____ Construction related to port expansion
_____	_____ O&M dredging
_____	_____ Lock and dam construction and maintenance
_____	_____ Construction of barge fleeting facilities and terminals
_____	_____ Private shoreline additions or modifications
_____	_____ Construction and improvements of recreational lakes
_____	_____ Construction of confined disposal facilities
_____	_____ Other _____

3. What kinds of construction/developmental activities seem to create the greatest problems in designing wetland sites for mitigation? (please use list in Question 2 as reference).

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4. What intensity of wetland restoration/creation is currently employed in your office for mitigation purposes? Give proportion if more than one type.

- ☐ None  
☐ 1 acre created for 1 acre lost  
☐ 2 for 1  
☐ 3 for 1  
☐ More (specify)  
☐ Replacement of functions lost

5. In what proportion (%) of the projects do you require:

- ☐ In-kind replacement by wetland type?  
☐ On-site?  
☐ Off-site?  
☐ In-kind replacement by wetland function lost?  
☐ On-site?  
☐ Off-site?  
Other?(specify) \_\_\_\_\_

\_\_\_\_\_

100%

6. A partial list of wetland types is provided below. Please indicate which of the wetland types are receiving pressures for development in your District by giving the proportion (%) of pressure exerted on each type. Example, 10% bogs.

- |   |  |
|---|--|
| <input type="checkbox"/> Bogs                 | <input type="checkbox"/> Prairie potholes        |
| <input type="checkbox"/> Bottomland hardwoods | <input type="checkbox"/> Saltwater marshes       |
| <input type="checkbox"/> Estuarine marshes    | <input type="checkbox"/> Seagrass beds           |
| <input type="checkbox"/> Fens                 | <input type="checkbox"/> Shrub carrs             |
| <input type="checkbox"/> Freshwater marshes   | <input type="checkbox"/> Tundra                  |
| <input type="checkbox"/> Lacustrine (lakes)   | <input type="checkbox"/> Vernal pools            |
| <input type="checkbox"/> Mangrove swamps      | <input type="checkbox"/> Wet meadows             |
| <input type="checkbox"/> Mud flats            | <input type="checkbox"/> Wooded and shrub swamps |
| <input type="checkbox"/> Playa lakes          | <input type="checkbox"/> Others (specify)        |

\_\_\_\_\_

## Restoration and Creation

7. Which wetland types are most often proposed for mitigation or habitat enhancement? (Indicate by letter(s) coded from the list above.)  
\_\_\_\_\_
8. Which wetland types are the most difficult to develop or restore in your District? (Indicate by letter(s) coded from the list above.)  
\_\_\_\_\_
9. Do you presently have guidelines for designing wetland sites?  
\_\_\_\_ Yes      \_\_\_\_ No
- a. If you do, what are they? \_\_\_\_\_  
\_\_\_\_\_
- Do the guidelines satisfy your needs?      \_\_\_\_ Yes      \_\_\_\_ No  
If not, what needs to be changed?  
\_\_\_\_\_  
\_\_\_\_\_
- b. If you do not have any guidelines, how do you design your mitigation plans? Explain. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Evaluation

10. How do you determine if a wetland created or restored is "successful"?  
Explain. \_\_\_\_\_  
\_\_\_\_\_
11. How were success criteria established? \_\_\_\_\_  
\_\_\_\_\_
12. Do you establish priorities for the types of wetlands to be created?  
\_\_\_\_ Yes      \_\_\_\_ No  
How? (Explain) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
13. Do you presently have guidelines for assessing functions and values of wetland sites which may be impacted by a project?      \_\_\_\_ Yes      \_\_\_\_ No
- a. If you do, what are they? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- Do they cover all appropriate functions?      \_\_\_\_ Yes      \_\_\_\_ No



Which functions are examined? (check each)

Hydrology Functions

- ☐ Groundwater recharge
- ☐ Groundwater discharge
- ☐ Floodwater storage
- ☐ Flood flow alteration
- ☐ Erosion control
- ☐ Water supply
- ☐ Other (specify) \_\_\_\_\_

Water Quality Functions

- ☐ Sediment retention
- ☐ Nutrient removal
- ☐ Toxicant removal
- ☐ Heavy metal removal
- ☐ Other (specify) \_\_\_\_\_

Habitat Functions

- ☐ Waterfowl
- ☐ Wetland-dependent birds
- ☐ Fish
- ☐ Mammals
- ☐ Reptiles
- ☐ Amphibians
- ☐ Endangered species
- ☐ Other (specify) \_\_\_\_\_

Socioeconomic Values

- ☐ Hunting
- ☐ Bird watching
- ☐ Fishing
- ☐ Recreation
- ☐ Education
- ☐ Aesthetics
- ☐ Other (specify) \_\_\_\_\_

Who established the guidelines?

Do they satisfy your needs? ☐ Yes ☐ No

Explain: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

b. If you do not have guidelines, what type of information do you need?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Monitoring/Enforcement**

14. Does your office monitor wetland restoration/creation projects required as part of a mitigation plan? ☐ Yes ☐ No

a. If yes, approximately what percent of mitigation sites are monitored more than four times per year during the first 2 years after establishment? \_\_\_\_\_%

- b. How often are newly created sites monitored during the first year after establishment? \_\_\_\_\_  
 the second year? \_\_\_\_\_  
 the third year? \_\_\_\_\_  
 subsequent years? \_\_\_\_\_
- c. If sites are not monitored at least four times during the first year after construction, please indicate the most common reason why not.
- \_\_\_\_\_ Lack of personnel  
 \_\_\_\_\_ Limited time  
 \_\_\_\_\_ Limited travel funds  
 \_\_\_\_\_ Rely on other sources (e.g., State agency personnel, other Federal agency personnel, etc.) (specify) \_\_\_\_\_  
 \_\_\_\_\_ other (specify) \_\_\_\_\_  
 \_\_\_\_\_

### End Products

15. In what areas do you need wetland mitigation information?
- \_\_\_\_\_ Plan formulation and the evaluation of alternative plans  
 \_\_\_\_\_ Preparation of NEPA documents (EIS's, EA's, etc.)  
 \_\_\_\_\_ Preparation of design memoranda and plans/specifications  
 \_\_\_\_\_ Evaluation of permit applications  
 \_\_\_\_\_ Regulatory enforcement actions  
 \_\_\_\_\_ Public hearings and other presentations  
 \_\_\_\_\_ Litigation  
 \_\_\_\_\_ Other (site design criteria, master plans, etc.)  
 (Specify) \_\_\_\_\_
16. How would you prefer to see this information presented?
- \_\_\_\_\_ Technical reports and manuals  
 \_\_\_\_\_ Short tech notes  
 \_\_\_\_\_ Training courses  
 \_\_\_\_\_ Workshops  
 \_\_\_\_\_ Dredging Operations Technical Support Program (DOTS)-like assistance (quick turnaround on specific projects)  
 \_\_\_\_\_ Other

17. When designing a wetland mitigation plan, do you need to know:

- ☐ Costs to construct?
- ☐ Design criteria?
- ☐ Methods to assess functions lost or those to replace?
- ☐ How to implement mitigation plan?
- ☐ Other (specify)\_\_\_\_\_

18. What qualities would you like to incorporate into a wetland mitigation protocol? (e.g., guidelines for creation of wetland sites, procedures for integrating designs into public meetings, monetary figures for creation, techniques to assess functions and values, etc.) Explain: \_\_\_\_\_

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19. Are you familiar with some mitigation techniques not employed by your office but that may be potentially useful in satisfying your needs?

☐ Yes    ☐ No    If yes, what are they? \_\_\_\_\_

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20. We intend to provide the findings of any mitigation protocol in a user's manual presenting a discussion of mitigation options, description of design criteria by wetland type, procedures for monitoring sites, and methods for assessing functions and values for newly restored/created and natural wetland sites. Would another method of presentation or other topics be more useful?

☐ Yes    ☐ No    If yes, explain.

21. Can you identify any mitigation sites which were viewed as successful by your District? Any unsuccessful? Please give wetland type, size, and reasons for success or failure. \_\_\_\_\_

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22. List any additional points, questions, and/or problems relative to wetland mitigation information which should be addressed. Use the back of this page if necessary for additional comments.

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## APPENDIX B: RESULTS OF SURVEY

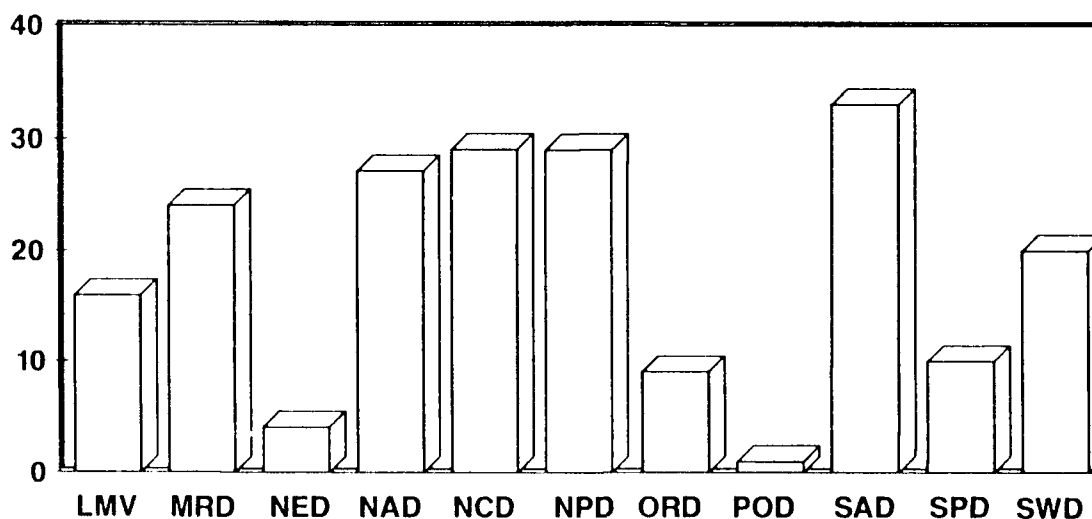
# **SURVEY OF CORPS OF ENGINEERS INFORMATION NEEDS AND CONCERNS FOR WETLANDS**

Mary C. Landin, Ph.D., and Ellis J. Clairain, Jr.

## **Introduction**

1. At the request of Headquarters, US Army Corps of Engineers (HQUSACE), CECW-OP, a 6-page questionnaire addressing Corps wetland needs and concerns was sent to Corps Districts and Divisions. The accompanying memorandum dated 9 June 1989, signed by Dr. Robert W. Whalin, Technical Director, US Army Engineer Waterways Experiment Station, asked that the questionnaire be given to all regulatory, planning, operational, natural resource, and engineering offices. A total of 203 responses were received from 33 Districts and 9 Divisions (not responding: South Pacific Division, Lower Mississippi Valley Division, St. Louis District, Louisville District, and San Francisco District) (Figure B1). When queried, St. Louis, Louisville, and San Francisco all indicated that they had filled out the questionnaire and routed it through channels for mailing. Apparently it was not mailed or was lost in the mail.

## **NUMBER OF RESPONSES**

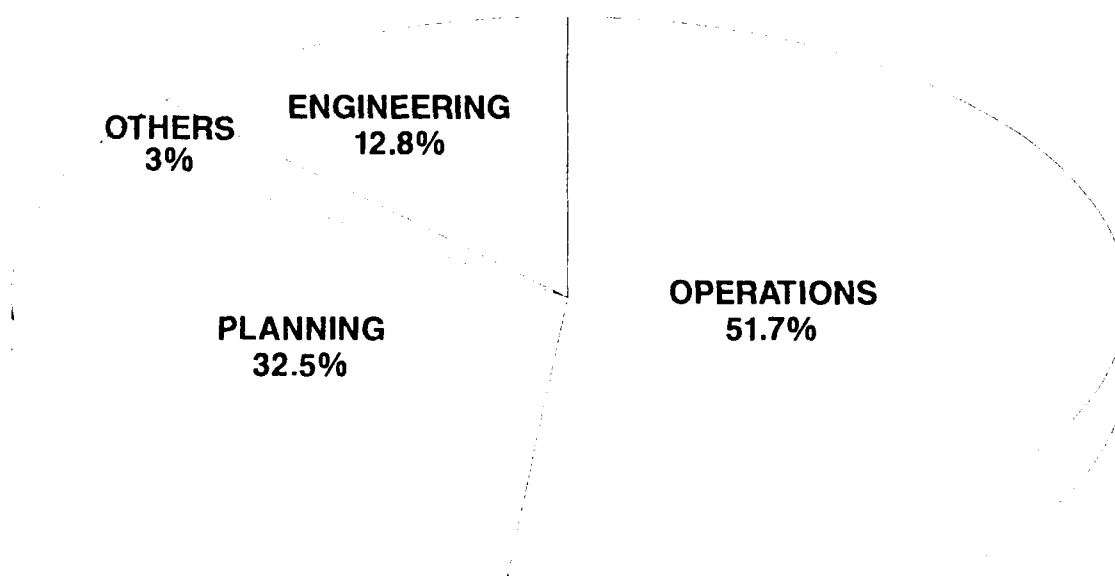


*Figure B1. Distribution of responses by Corps Division (LMV = Lower Mississippi Valley Division, MRD = Missouri River Division, NED = New England Division, NAD = North Atlantic Division, NCD = North Central Division, ORD = Ohio River Division, POD = Pacific Ocean Division)*

2. As a follow-up to the survey, on 13-15 September 1989, a Corps workshop was held. The workshop had two major objectives: (a) to characterize information needs as they pertain to wetlands associated with Corps regulatory, operational, planning, and engineering requirements, and (b) to help identify, refine, and prioritize research and development in these areas.

3. An analysis of questionnaire data has been made, and the results are presented in this document. Topics for the September workshop were chosen based on questionnaire response and on the task areas outlined in the draft documentation for the proposed Wetland Research Program.

4. In an assessment of questionnaire responses, some generalities apply. For example, many of the respondents were quite candid as to wetland needs and concerns in their District. Only a few respondents chose not to sign their names, and most indicated strong feelings about the Corps' role in wetlands and where it should be going. Questionnaires were received from all offices within Districts, with highest numbers by Regulatory (Operations) and Environmental Resources (Planning) offices (Figure B2). However, Engineering, Natural Resources, Real Estate, and Navigation offices were also represented, especially in the South Atlantic Division (SAD). Most Division responses were from one person only. Display of data varies within this document due to type of question asked and responses received to the questionnaire. For example, some questions required ranking categories while other questions and answers allowed simple means and tabular data to be displayed.



*Figure B2. Distribution of responses by operational element*

## Question 1

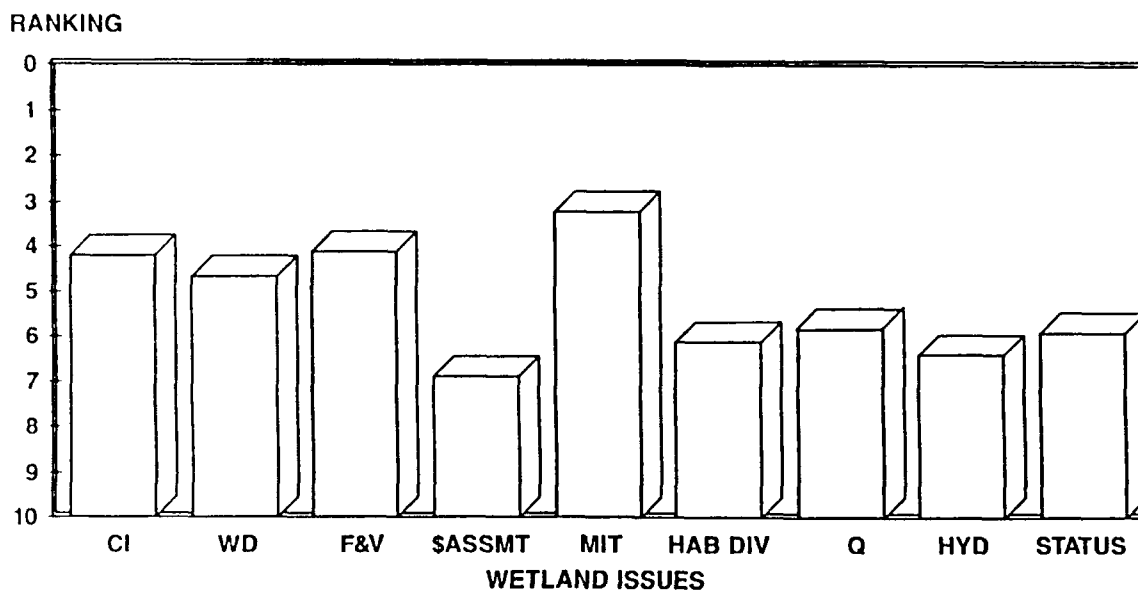
5. Some wetland issues which may be examined are listed below. Please rank each issue according to your own District's priorities and needs.

**ANSWER:** Wetland issues were ranked from 1 to 9, with No. 1 considered most important (Figure B3). Responses were fairly consistent regardless of geographical distribution. Responses were received from all Divisions. Only issues listed in the survey were ranked, no additional issues were identified by respondents although space was provided for others. Issues associated with mitigation, evaluation of functions and values, cumulative impacts, and delineation were most often ranked of major importance. These issues were also of primary concern within planning, operations, and engineering Divisions (Figure B4). A tabular display by Division is presented below according to wetland issues. Numbers represent average rank for each issue. A geometric mean rank is also provided representing average rank weighted by total number of responses.

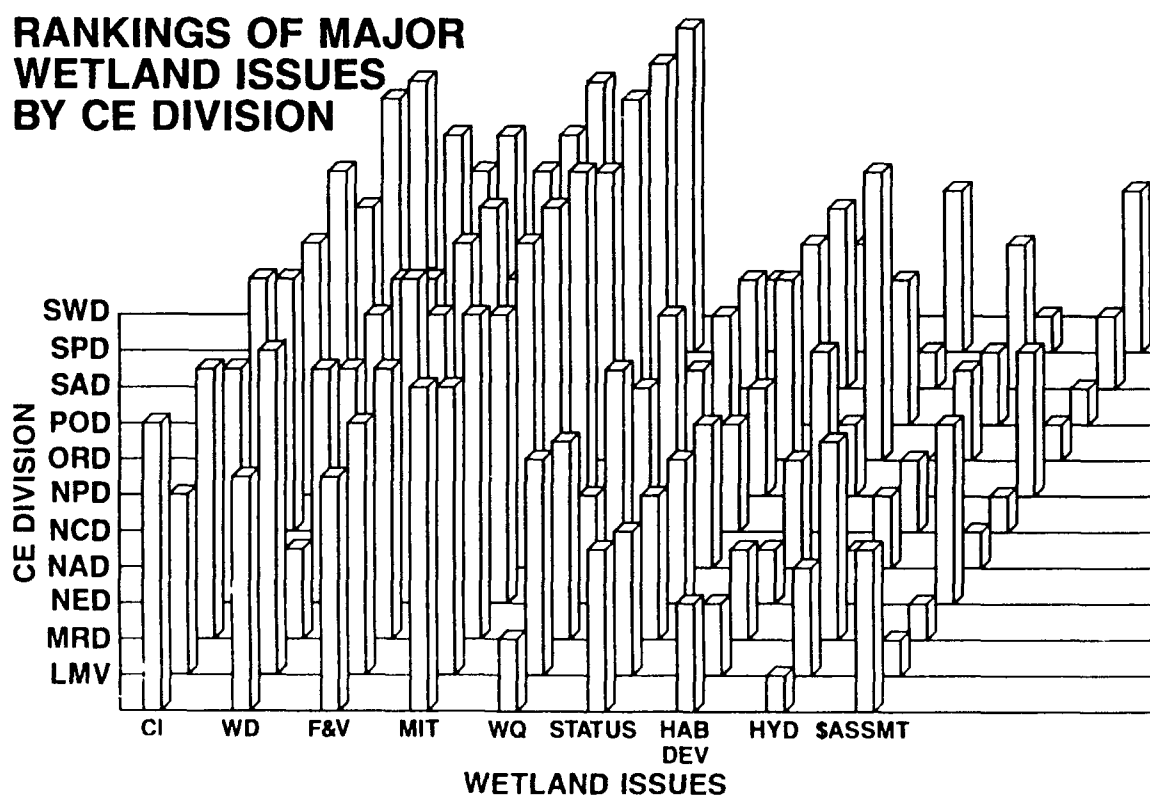
	<u>LMV</u>	<u>MRD</u>	<u>NED</u>	<u>NAD</u>	<u>NCD</u>	<u>NPD</u>	<u>ORD</u>	<u>POD</u>	<u>SAD</u>	<u>SPD</u>	<u>SWD</u>	Geometric Mean Rank
Cumulative impacts	4.5	5.1	4.7	4.4	3.7	3.8	4.3	1.0*	5.2	3.3	4.1	4.3
Wetland delineation	5.1	3.2	6.7	4.4	5.1	5.0	5.3	2.0	4.6	4.9	4.2	4.6
Evaluation of functions and values	5.1	4.3	3.9	4.3	4.7	3.4	4.1	2.0	4.7	4.2	4.1	4.2
Monetary assessment	6.2	7.4	6.1	7.5	7.2	6.8	5.8	9.0	7.2	7.1	6.1	6.8
Mitigation	3.6	3.4	4.1	2.9	4.5	2.7	3.1	1.0	3.8	3.0	3.5	3.4
Habitat res/crea. on dredged material	6.3	6.4	6.8	5.8	6.7	5.5	7.0	1.0	5.7	7.7	6.1	6.2
Influence of wetlands on water quality	6.7	4.8	6.4	5.1	5.5	5.9	5.6	3.0	5.8	6.6	6.7	5.8
Influence of wetlands on hydrology	7.1	5.7	6.8	6.4	5.5	6.3	7.1	3.0	6.2	6.5	7.2	6.5
Wetlands status (gains, losses)	6.2	5.3	6.2	5.7	6.0	6.0	6.9	2.0	5.5	5.2	6.5	5.9

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\* POD had one response and ranked selected issues from one to three. Monetary assessment was not ranked so it was assigned the lowest ranking (9).



*Figure B3. Ranking of major wetland issues nationally*



*Figure B4. Rankings of major wetland issues by CE Division*



## Question 2

6. What types of construction/developmental activities are most commonly proposed in wetland permit applications and civil works projects in your office? Please indicate response by percentages.

Activities listed included the following:

- |    | Permits | Civil Works |   |
|----|---------|-------------|---|
| A. | ___     | ___         | Highway and road construction and improvements      |
| B. | ___     | ___         | Urban and commercial construction and expansion     |
| C. | ___     | ___         | Marina dredging, construction, or expansion         |
| D. | ___     | ___         | Construction or repair of bulkheads and piers       |
| E. | ___     | ___         | Farming practices                                   |
| F. | ___     | ___         | Forestry practices                                  |
| G. | ___     | ___         | Sand, gravel, and coal mining                       |
| H. | ___     | ___         | Military activities                                 |
| I. | ___     | ___         | Construction related to port expansion              |
| J. | ___     | ___         | O&M Operations and Maintenance dredging             |
| K. | ___     | ___         | Lock and dam construction and maintenance           |
| L. | ___     | ___         | Private shoreline additions or modifications        |
| M. | ___     | ___         | Construction and improvements of recreational lakes |
| N. | ___     | ___         | Construction of confined disposal facilities        |
| O. | ___     | ___         | Other   |

**ANSWER:** Less people responded to this question than many others but there was a fairly clear distinction between responses from planning and operations personnel. Planning personnel indicated most concerns were associated with O&M dredging, and added topics under Other to include flood control, navigation improvements, channel improvements, and protection of confined disposal facilities. Operations personnel indicated that nearly all topics listed are considered important but primarily highway construction, urban and commercial construction, and marinas (Figure B5). A tabular presentation for permits and for civil works is presented below.

### Results for Permits (in percentages)

Responses	LMV (6)	MRD (19)	NED (2)	NAD (17)	NCD (20)	NPD (19)	ORD (6)	POD (1)	SAD (21)	SPD (5)	SWD (10)
A	9.2	25.2	12.0	14.1	11.1	12.7	16.7	20.0	9.3	12.4	12.0
B	10.9	11.8	43.5	24.1	34.7	28.7	17.6	50.0	21.9	36.6	18.2
C	11.0	3.2	18.5	5.8	13.3	6.6	7.8	20.0	8.6	5.8	4.3
D	3.8	0.8	5.5	12.1	6.3	7.4	2.5	0.0	14.0	4.0	6.1
E	5.8	16.4	1.0	2.0	7.2	6.3	3.4	5.0	4.0	10.4	11.3
F	2.5	4.6	1.0	1.5	0.2	5.9	3.0	0.0	4.9	1.4	4.9
G	5.7	7.8	1.0	2.0	2.0	6.8	10.1	0.0	4.7	4.6	9.7

(Continued)

Responses	LMV (6)	MRD (19)	NED (2)	NAD (17)	NCD (20)	NPD (19)	ORD (6)	POD (1)	SAL (21)	SPD (5)	SWD (10)
H	4.5	1.6	1.0	1.5	0.1	1.4	0.0	0.0	1.8	2.4	5.0
I	5.3	0.6	3.0	1.9	0.4	2.2	2.0	0.0	4.4	1.6	2.6
J	11.4	1.3	0.0	8.1	3.1	2.8	0.8	0.0	0.5	1.4	1.5
K	0.5	1.3	1.0	3.4	1.1	0.6	0.0	0.0	0.7	1.4	6.8
L	6.8	1.4	0.5	4.5	2.6	1.2	10.0	0.0	5.0	1.4	2.3
M	3.8	10.0	9.5	1.0	12.0	5.8	10.6	5.0	12.8	4.4	2.8
N	0.8	6.2	1.0	1.0	1.8	2.2	4.5	0.0	2.6	4.4	2.8
O	5.8	1.6	1.0	7.0	2.2	1.9	0.0	0.0	1.9	1.4	1.0
P	12.2	6.2	0.5	1.6	1.9	7.5	11.0	0.0	2.9	6.4	8.7

**Results for Civil Works (in percentages)**

Responses	LMV (15)	MRD (11)	NED (2)	NAD (15)	NCD (14)	NPD (12)	ORD (4)	POD (0)	SAD (17)	SPD (5)	SWD (15)
A	3.3	19.7	0.0	6.3	2.6	2.5	1.2	0.0	9.2	5.0	4.0
B	0.7	6.7	0.0	3.0	1.9	6.9	2.5	0.0	0.6	16.6	8.0
C	3.2	6.7	10.0	5.8	4.1	9.5	6.2	0.0	2.5	4.0	2.7
D	0.3	6.2	0.0	9.0	2.4	3.6	4.2	0.0	1.4	3.0	3.0
E	6.7	0.6	0.0	0.0	1.8	0.4	0.0	0.0	0.0	2.0	3.7
F	0.0	1.5	0.0	0.0	2.3	0.8	0.0	0.0	1.5	0.0	0.3
G	0.0	2.5	0.0	0.0	0.8	0.2	0.0	0.0	0.3	9.8	1.3
H	7.5	7.0	10.0	7.4	0.1	6.8	7.2	0.0	3.6	12.0	4.0
I	3.3	1.3	0.0	3.3	1.8	12.6	1.8	0.0	9.0	9.6	3.9
J	20.5	5.2	10.0	25.3	31.1	19.2	14.8	0.0	35.4	14.0	10.4
K	0.7	1.7	10.0	4.0	11.8	17.1	28.8	0.0	5.9	3.0	7.8
L	2.0	0.5	0.0	0.0	0.9	3.5	0.0	0.0	0.6	3.0	0.3
M	0.0	8.5	0.0	0.9	0.3	6.9	3.8	0.0	1.8	0.0	3.0
N	0.7	15.3	0.0	3.6	6.3	1.1	21.2	0.0	2.6	0.0	14.0
O	11.8	2.8	10.0	21.0	6.9	3.5	8.3	0.0	12.6	4.0	4.0
P	39.3	13.8	50.0	10.4	24.9	5.4	0.0	0.0	13.0	14.0	29.6

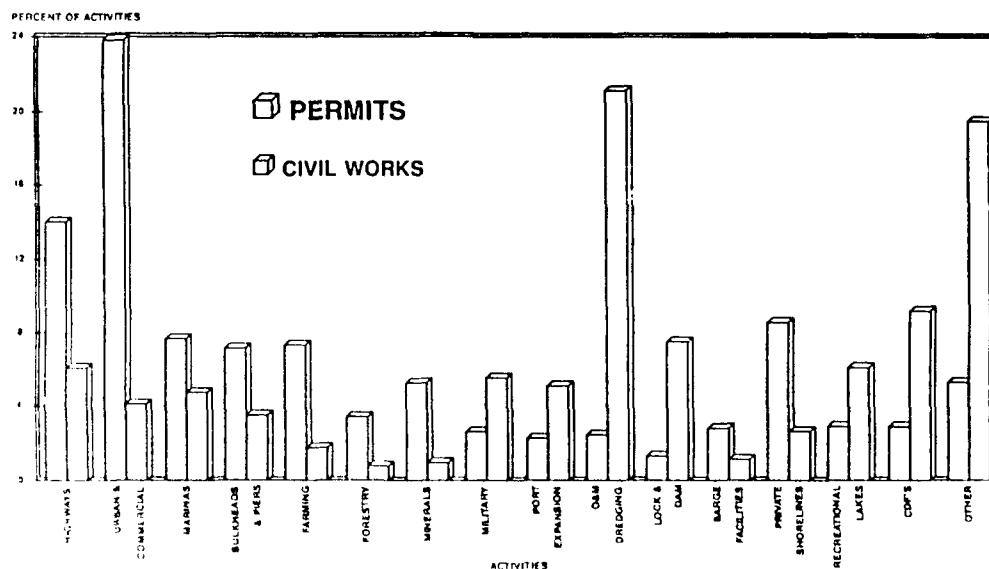


Figure B5. Most commonly proposed construction/developmental activities

### Question 3

7. What kinds of construction/development activities seem to create the greatest problems in designing wetland sites for mitigation?

**ANSWER:** Answers to Question 3 were somewhat regional specific. However, there are a number of problems identified that covered every District and Division in the Corps. Some problems identified with certain offices. For example, Construction and Operations people were more likely to report O&M dredging as a problem, while Regulatory offices were more likely to report trouble in finding suitable mitigation sites, in dealing with permits involving mature forested wetlands, or cumulative impacts from small private projects. A breakdown, by Division, of the kinds of activities and problems most often named by respondents is presented below.

	LMV	MRD	NAD	NCD	NED	NPD	ORD	POD	SAD	SPD	SWD
Lack of guidelines	+	+	+	+	+	+	+		+	+	+
Lack of design and implementation criteria	+	+	+		+	+	+		+	+	+
Lack of suitable sites for mitigation	+	+	+	+	+	+	+		+	+	+
Mitigating for mature forested wetlands	+	+		+	+	+	+		+		+
Lack of funding	+	+	+	+		+	+		+	+	+
Highway construction		+	+	+	+	+	+	+	+	+	+
Unrealistic resource agency expectations		+	+		+				+		+
Reservoirs and lakes		+	+	+		+	+		+	+	+
Timing			+			+			+		+
Coastal construction	+		+		+	+			+	+	+
Contractor compliance	+		+				+				+
Urban levees	+		+							+	
Dam construction		+	+	+		+	+		+		+
Farming practices	+	+		+		+	+		+		+
Forestry practices	+			+		+	+		+		+
Site preparation	+					+			+		
Wetland encroachment	+	+	+	+	+	+	+	+	+	+	+
Flood control	+	+	+	+	+	+	+		+	+	+
Channelization	+	+					+		+	+	+
O&M dredging	+	+	+	+	+	+	+		+	+	+
Dredged material placement	+	+	+	+	+	+	+		+	+	+
Confined disposal facilities	+		+	+					+		+
Large drainage work	+	+	+	+		+	+		+		

(Continued)

	LMV	MRD	NAD	NCD	NED	NPD	ORD	POD	SAD	SPD	SWD
Urban expansion and development	+	+	+	+	+	+	+	+	+	+	+
Navigation work	+	+	+	+		+			+		+
Small private projects	+	+	+	+	+	+	+		+	+	+
Marina construction		+	+	+		+	+		+		+
Sedimentation		+		+		+	+		+	+	+
Non-water-dependent construction		+	+	+		+	+		+	+	+
Cumulative impacts	+	+	+	+	+	+	+		+	+	+
Site selection			+			+					+
Poor wetlands databases				+							
Lack of acceptance of mitigation				+	+	+			+		+
Lack of success with developing habitats for wildlife					+						
Oil and gas development						+					+
Placer mining						+					
Tundra destruction						+					
Illegal fills						+			+		+
Levees and banks	+	+		+		+	+		+		+
Sand and gravel mining							+		+		
Coal mining and handling							+				
Phosphate mining									+		
Water shortages											+

#### Question 4

8. What intensity of wetland restoration/creation is currently employed in your office for mitigation purposes?

**ANSWER:** There was a wide range of responses to this question, with most respondents checking more than one level of mitigation (Figure B6). It was obvious in some Districts that the level of mitigation required was project and site specific. However, 92 respondents stated that they sought replacement of functions lost, while 84 indicated that their usual level of mitigation was 1:1. Thirty-nine indicated that their office did not mitigate, and the assumption is being made that this is due to the respondent not being in that District's regulatory office. A breakout, by Division, of level of mitigation required is presented below.

	None	1:1	2:1	3:1	>3:1	Replacement of Lost Functions
LMVD	1	5	1	0	0	8
MRD	3	14	1	1	0	10
NAD	4	18	11	2	0	13
NCD	7	14	4	1	1	10
NED	1	1	0	0	0	2
NPD	8	9	3	2	0	15
ORD	1	5	1	1	0	2
POD	1	1	1	0	0	1
SAD	9	11	6	2	1	14
SPD	0	2	2	2	2	4
SWD	4	4	0	0	0	13
TOTALS	39	84	30	11	4	92

**WHAT INTENSITY OF WETLAND RESTORATION/  
CREATION IS CURRENTLY EMPLOYED IN YOUR  
OFFICE FOR MITIGATION PURPOSES? GIVE  
PROPORTION IF MORE THAN ONE TYPE.**

NUMBER OF RESPONSES

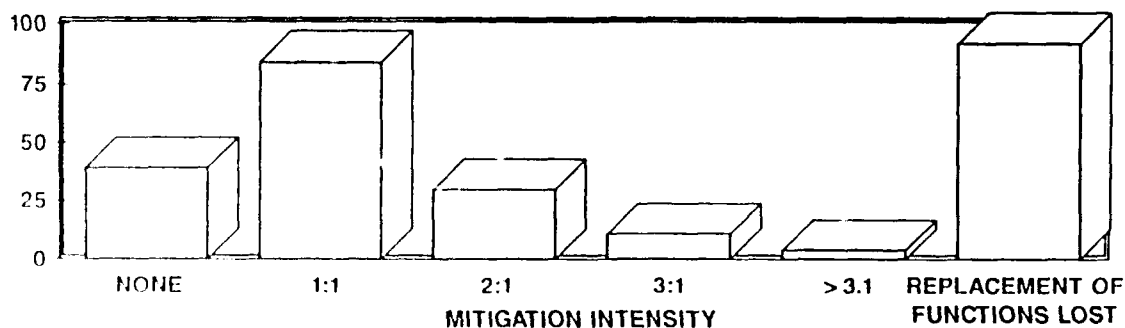


Figure B6. Mitigation intensity

### Question 5

9. What proportion (%) of these projects do you require: in-kind replacement by wetland type (on-site or off-site), or in-kind replacement by wetland function lost (on-site and off-site)?

**ANSWER:** This question asked for percentages of types of mitigation in projects, but when answers were received, it was apparent that the data could not be compiled using percentages due to the large variation in responses. Therefore, the data are presented as tallies of types of mitigation within Divisions. However, across all Divisions, by far the greatest mitigation required was either in-kind on-site by wetland types or in-kind on-site by wetland function. Off-site mitigation was avoided, and there was no mention by any respondent of out-of-kind mitigation occurring. Thirty people did indicate that some form of mitigation occurred other than those listed, but did not elaborate. A number of respondents did not answer this question in any way.

	<u>In Kind by Wetland Type</u>		<u>In Kind by Wetland Function</u>		<u>Other Mitigation</u>
	<u>On-Site</u>	<u>Off-Site</u>	<u>On-Site</u>	<u>Off-Site</u>	
LMVD	5	5	6	6	1
MRD	16	7	11	5	2
NAD	16	9	10	6	3
NCD	15	7	14	6	5
NED	2	0	1	0	2
NPD	9	4	7	5	9
ORD	6	6	5	6	0
POD	1	0	1	0	0
SAD	16	11	10	5	5
SPD	7	2	5	3	2
SWD	7	6	11	8	1
TOTALS	100	57	81	50	30

### Question 6

10. A partial list of wetland types is provided below. Please indicate which of the wetland types are receiving pressures for development in your District by giving the proportion (%) of pressure exerted on each type.

- |                         |                            |
|-------------------------|----------------------------|
| A. Bogs                 | J. Prairie potholes        |
| B. Bottomland hardwoods | K. Saltwater marshes       |
| C. Estuarine marshes    | L. Seagrass beds           |
| D. Fens                 | M. Shrub carrs             |
| E. Freshwater marshes   | N. Tundra                  |
| F. Lacustrine (lakes)   | O. Vernal pools            |
| G. Mangrove swamps      | P. Wet meadows             |
| H. Mud flats            | Q. Wooded and shrub swamps |
| I. Playa lakes          | R. Others                  |

**ANSWER:** Across all Divisions, bottomland hardwoods, freshwater marshes, wet meadows, and wooded and shrub swamps were the types of wetlands receiving the most developmental pressure (Figure B7). However, this question, as expected, had regional answers based on the prevalent types of wetlands encountered in a given Division. These are reflected in the following table. Answers were given in percentages equaling 100 by respondents. A weighted analysis giving an average percentage for each of the designated wetland types within each Division was conducted, and is presented below. Letters in the table correspond to the letters assigned to each wetland type in Question 6. Named wetland types in Category R were riparian (streambank) wetlands, pocket (isolated) wetlands, or brackish (5-25 ppt) marshes.

**PLEASE INDICATE WHICH WETLAND TYPES ARE RECEIVING PRESSURES FOR DEVELOPMENT IN YOUR DISTRICT BY GIVING THE PROPORTION (%) OF PRESSURE EXERTED ON EACH TYPE.**

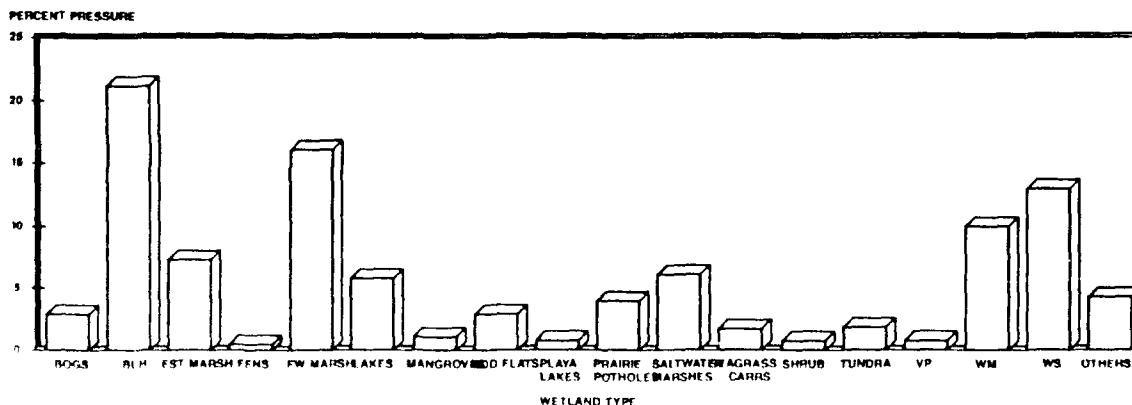


Figure B7. Wetland types receiving developmental pressures

	LMV	MRD	NAD	NED	NCD	NPD	ORD	POD	SAD	SPD	SWD
A		0.8	3.2	2.6	2.1	1.0	8.7		4.1	0.1	0.05
B	53.3	20.8	11.1		27.5	0.3	36.8		24.7	10.4	29.2
C	11.4		16.7	3.3		13.6		5.0	20.3	14.3	8.6
D		0.2	0.8	0.2		0.8	0.1				
E	8.2	9.8	15.6	7.2	24.9	17.1	8.4	10.0	9.3	14.1	19.0
F	3.3	11.1	2.2	3.4	5.7	4.1	7.9		4.4	2.9	6.9
G			0.1					10.0	3.9		0.1
H	0.2	0.6	4.7	10.4	0.2	3.5	6.3		2.4	2.6	3.5
I		0.5	0.1							2.4	4.8
J		23.1	0.2								
K	6.2		14.9	25.5	0.1	5.8		5.0	12.1	14.2	8.1
L	0.2		3.6	3.4		2.5		65.0	3.3	3.7	0.1
M		0.3	0.2			0.1					
N			0.2			12.2					
O		1.5	0.3	0.2	0.3	0.1				10.3	
P	2.3	14.5	3.0	12.4	18.2	18.5	4.1	5.0	3.1	13.6	9.2
Q	14.9	9.4	23.1	31.4	20.9	20.3	23.6		11.5		10.4
R		7.4			0.1	0.1	4.1		0.9	11.4	0.1



### Question 7

11. Which wetland types are most often proposed for mitigation or habitat enhancement?

**ANSWER:** Most respondents to this question gave regional-specific answers; however, a number of people who answered Question 6 did not answer Questions 7 and 8 concerning most critical wetland types. The most frequent explanation, when one was offered, was that the respondent did not have that information in the office. In general, regardless of Division, most frequently identified wetlands for which mitigation was requested were freshwater marshes and wooded swamps. In addition, coastal Divisions frequently had estuarine marshes proposed, and all but NAD, NED, and POD identified bottomland hardwoods as a wetland type proposed for both mitigation or habitat enhancement. A breakout by Division is presented below, according to the wetland types identified in Question 6.

	LMV	MRD	NAD	NCD	NED	NPD	ORD	POD	SAD	SPD	SWD	TOTALS
A	0	1	1	0	0	1	0	0	2	0	0	5
B	13	6	1	7	0	1	3	0	15	2	10	58
C	3	0	11	1	0	7	0	1	16	5	2	46
D	0	0	0	0	0	0	0	0	0	0	0	0
E	4	8	12	25	2	15	8	1	9	5	9	98
F	0	6	6	3	0	5	3	0	1	0	2	26
G	0	0	0	0	0	0	0	0	7	0	1	8
H	0	0	1	0	0	1	0	0	1	0	1	4
I	0	0	0	0	0	0	0	0	0	0	0	0
J	0	7	0	3	0	0	0	0	0	0	0	10
K	1	0	10	0	1	4	0	0	19	5	4	44
L	0	0	1	0	0	0	0	1	3	2	0	7
M	0	0	0	2	0	0	0	0	1	0	0	3
N	0	0	0	0	0	5	0	0	0	0	0	5
O	0	0	0	1	0	0	0	0	0	3	0	4
P	0	2	2	11	2	4	2	0	3	3	1	30
Q	5	4	7	3	2	4	6	0	11	1	1	44
R	2	3	1	0	1	1	2	0	0	4	0	14

### Question 8

12. Which wetland types are the most difficult to develop or restore in your District?

**ANSWER:** Again, most respondents to this question gave regional-specific answers, and a number of respondents did not answer this question. However, a large number identified freshwater wetland types (bogs, bottomland hardwoods, marshes, wet meadows, and wooded and shrub swamps) and salt and estuarine marshes as the ones they knew least about developing. A breakout by Division is presented below, according to the wetland types identified in Question 6.

	LMV	MRD	NAD	NCD	NED	NPD	ORD	POD	SAD	SPD	SWD	TOTALS
A	0	1	2	5	1	5	1	0	2	1	0	18
B	5	8	3	8	0	1	4	0	17	3	6	55
C	4	0	1	0	0	0	0	0	6	1	0	12
D	0	0	0	8	1	0	0	0	0	0	0	9
E	1	3	4	3	0	5	0	0	6	5	3	30
F	1	2	1	2	0	0	0	0	1	0	0	7
G	0	0	0	0	0	0	0	1	3	0	0	4
H	0	0	1	0	0	0	0	0	0	0	0	1
I	0	0	0	0	0	0	0	0	0	1	2	3
J	0	7	0	1	0	0	0	0	0	0	0	8
K	1	0	2	0	0	2	0	0	6	1	2	14
L	0	0	3	0	0	2	0	0	4	1	0	10
M	0	0	0	1	0	0	0	0	0	0	0	1
N	0	0	0	0	0	7	0	0	1	0	0	8
O	0	0	0	1	0	0	0	0	0	4	0	5
P	0	1	1	6	0	4	0	1	2	3	0	18
Q	7	4	12	10	2	9	3	0	9	3	0	59
R	0	2	2	0	0	3	0	0	1	1	0	9

### Question 9

13. Do you presently have guidelines for designing wetland sites? If you do, what are they? Do the guidelines satisfy your needs? If you do not have guidelines, how do you design your mitigation plans?

**ANSWERS:** A total of 187 of the 203 respondents replied to this question; 20 percent (38) affirmatively and 80 percent (149) negatively (see Division breakout below). Of the 38 who responded yes, only six were satisfied with the guidelines they used. Of those 38, 17 (45 percent) identified WES as their source of guidelines, 9 said they contacted other agencies, and 12 gave no source. The 149 respondents who said they had no guidelines either did not identify how they designed sites, or said they used professional judgment.

	<u>Planning</u>		<u>Operations</u>		<u>Other Offices</u>		<u>Totals</u>	
	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>
LMVD	6	3	3	0	2	2	11	5
MRD	2	1	15	0	5	0	22	1
NAD	3	8	8	3	3	0	14	11
NCD	8	1	11	4	1	1	20	6
NED	0	1	2	1	0	0	2	2
NPD	4	0	15	2	6	2	25	4
ORD	2	1	5	0	0	0	7	1
POD	0	0	1	0	0	0	1	0
SAD	10	2	13	4	1	0	24	6
SPD	3	0	2	2	1	0	6	2
SWD	7	0	6	0	4	0	17	0
TOTALS	45	17	81	16	23	5	149	38

### Question 10

14. How do you determine if a wetland created or restored is successful?

**ANSWER:** A total of 178 of the 203 respondents answered this question. Their responses were sorted into four categories: (a) those using monitoring, (b) those determining survival of plants only, (c) those having permit applicants monitor the site, and (d) those making no measurements or determinations. Results, by Division, are presented below. No attempt to separate replies within Districts was made, although it was noted that personnel within Districts often contradicted one another with their responses to this question. For example, one engineering respondent said that his District's regulatory people monitored, and his regulatory counterparts responded that they did not determine success at all.

	Monitoring	Survival Only	Permit Enforcement	None
LMVD	5	0	0	7
MRD	5	5	0	16
NAD	8	11	0	1
NCD	21	3	2	3
NED	2	0	0	2
NPD	15	6	2	4
ORD	5	1	0	0
POD	1	0	0	0
SAD	6	8	4	10
SPD	4	2	2	0
SWD	5	5	0	6
TOTALS	77	41	10	50

### Question 11

15. How were success criteria established?

**ANSWER:** Of the 128 respondents who said they had some form of success measurements, most identified Federal and State resource agencies other than the Corps as the source of their criteria. A few respondents used in-house criteria, and a few more used actual project objectives and goals to measure success. Among respondents, this appeared to be a very sore point, as many stated later in their questionnaire that they wanted to monitor and to see successful sites built, but their hands were tied by manpower, budget, and administrative constraints.

### Question 12

15. Do you establish priorities for the types of wetlands to be created?

**ANSWER:** Fifty-six of the respondents did not answer this question. Most of those responding affirmatively explained that they either prioritize by in-kind replacement, or by targeting desired functions and values. Across all Divisions, only 50 (34 percent of responses) responded affirmatively.

	<u>YES</u>	<u>NO</u>
LMVD	5	8
MRD	2	17
NAD	11	10
NCD	7	14
NED	0	3
NPD	11	12
ORD	2	5
POD	0	1
SAD	4	14
SPD	2	5
SWD	6	8
<u>TOTALS</u>	<u>50</u>	<u>97</u>

### Question 13

17. Do you presently have guidelines for assessing functions and values of wetland sites which may be impacted by a project? Do they cover all appropriate functions? Which functions are examined? Do they satisfy your needs? If you do not have guidelines, what type of information do you need?

**ANSWER:** Only 175 respondents answered this question, and they were split nearly evenly in their reply (89 affirmatives and 86 negatives) (Figure B8). Virtually all affirmative respondents identified either WET, HEP, HES, or some localized guidelines from EPA, FWS, or state agencies as their source of guidelines. Virtually all respondents who responded to the question in any way replied that they had no guidelines that covered all functions (Figure B9). A breakout by Division is presented below. A breakout by elements within Districts and Divisions is presented in Figure B10. Most respondents who answered Item a in detail expanded the question to identify functions presently examined in their District as well as functions that they wished would be examined. These are combined in Column 3 below.

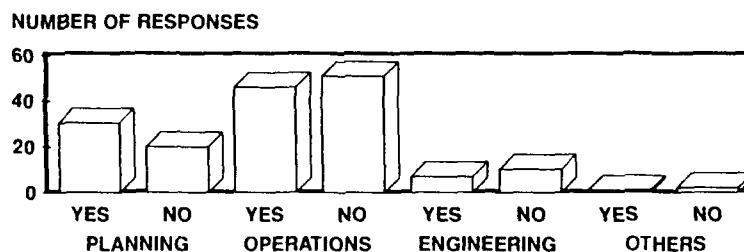
	<u>YES</u>	<u>NO</u>	<u>Functions Presently Examined or That Respondents Wished Would Be Examined*</u>
LMVD	7	6	W,V,R,F,FFA,FW
MRD	5	17	S,FFA,FW,E,N,R,WS
NAD	17	5	All listed**
NCD	11	17	W,F,V,R,SR,GW,E,WS
NED	3	1	All listed
NPD	15	10	All listed
ORD	2	6	All listed
POD	0	1	None listed
SAD	17	11	All listed
SPD	5	3	All listed
SWD	7	9	All listed
TOTALS	89	86	

\* W = general wildlife; F = general fisheries; V = vegetation;  
R = both consumptive and non-consumptive recreation;  
FW = flood-water storage; FFA = flood flow alternation;  
S = sediment retention; E = erosion control; N = nutrient  
removal; WS = water supply; GW = groundwater.

\*\* At least one respondent in that Division checked every  
function listed in the question, so that most critical needs  
could not be separated.

Figure B8. Existence of guidelines for assessing functions and values of wetland sites

# DO YOU PRESENTLY HAVE GUIDELINES FOR ASSESSING FUNCTIONS AND VALUES OF WETLAND SITES WHICH MAY BE IMPACTED BY A PROJECT?



## DO THEY COVER ALL APPROPRIATE FUNCTIONS?

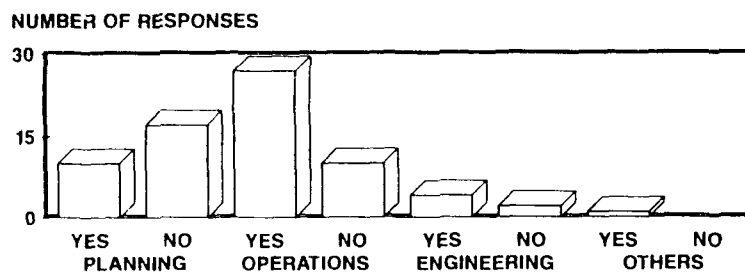
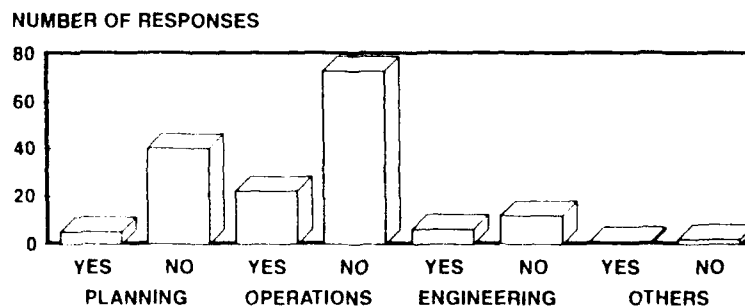


Figure B9. Extent to which guidelines cover all functions

## DO THEY SATISFY YOUR NEEDS?

Figure B10. Extent to which guidelines satisfy needs of elements within Districts and Divisions



### Question 14

18. Does your office monitor wetland restoration/development projects required as part of a mitigation plan?

(a) If yes, what percent of mitigation sites are monitored more than four times each year during the first 2 years after establishment? How often are newly created sites monitored during the first year after establishment?

(b) If sites are not monitored at least four times during the first year, indicate the most common reasons why not.

**ANSWER:** Again, 175 respondents answered this question, 103 (59 percent) affirmatively and 72 (41 percent) negatively. Of those who responded affirmatively, virtually all said that their Districts monitored sites generally once a year, and very rarely 2 to 3 times a year. Virtually all stated that their Districts monitored less than 10 percent of their mitigation projects. A breakdown by Division is presented below.

	No	Yes	How Often?	Percent Monitored?
LMVD	13	1	Once/yr	<5
MRD	12	12	Twice/yr	<5
NAD	8	15	2-3/yr	<10
NCD	10	17*	Twice/yr	<10
NED	1	3	Once/yr	<5
NPD	6	20	1-2/yr	<5
ORD	4	4	Once/yr	<5
POD	0	1	Once/yr	<5
SAD	8	17	Once/yr	<5
SPD	3	5	Once/yr	<5
SWD	7	8	Once/yr	<10
TOTALS	72	103	Once/yr	<5

\* Several respondents in the St. Paul District indicated that they monitored 100 percent of all mitigation sites. This was the only District to do so.



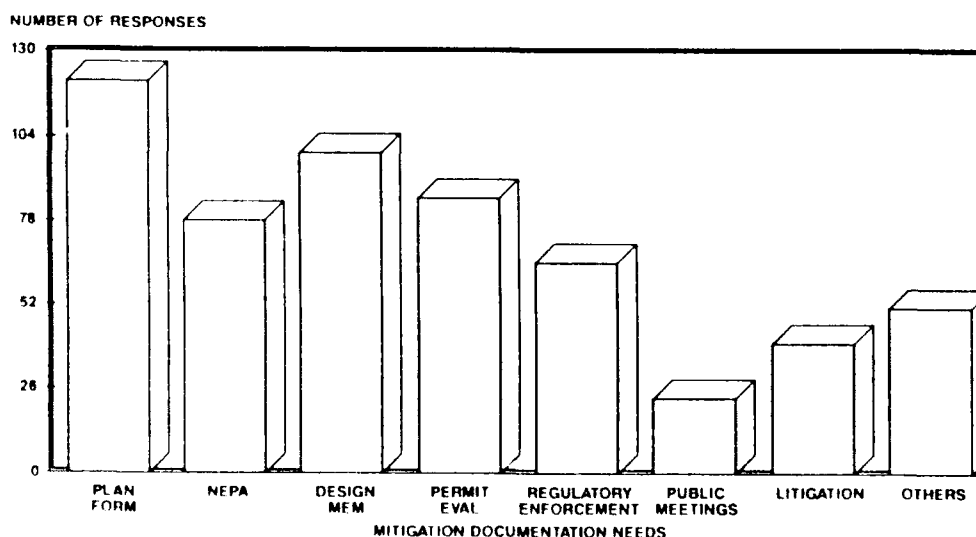
## Question 15

19. In what areas do you need wetland mitigation information?

**ANSWER:** A total of 184 respondents marked one or more of the eight items listed in this question. Nearly all marked more than one answer, and numbers in the breakout by Division presented below and in Figure B11 reflect multiple responses.

	1*	2	3	4	5	6	7	8
LMVD	13	11	8	5	4	2	2	3
MRD	17	6	16	7	7	3	5	8
NAD	17	15	13	12	10	5	7	2
NCD	15	8	16	16	8	2	3	8
NED	0	1	3	1	0	0	0	2
NPD	16	12	10	14	10	4	7	10
ORD	7	5	6	6	5	2	4	4
POD	0	0	1	1	0	0	1	0
SAD	16	8	14	14	11	4	8	8
SPD	8	3	2	3	3	1	2	1
SWD	12	9	10	6	7	0	1	5
TOTALS	121	78	99	85	65	23	40	51

- \* 1 = Plan formulation and evaluation of alternative plans  
 2 = Preparation of NEPA documents  
 3 = Preparation of design memoranda and plans/specifications  
 4 = Evaluation of permit applications  
 5 = Regulatory enforcement actions  
 6 = Public hearings and other presentations  
 7 = Litigation  
 8 = Other (site design criteria, master plans, monitoring)



*Figure B11. Mitigation documentation needs*

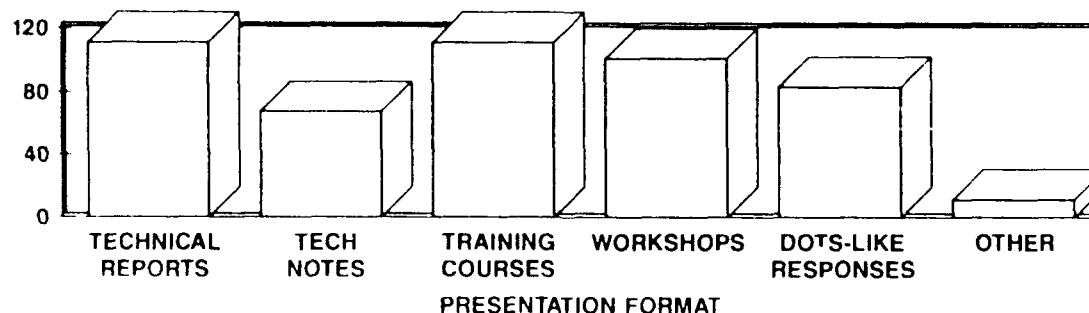
### Question 16

20. How would you prefer to see this information presented?

**ANSWER:** A total of 184 respondents answered this question by checking one or more of the technology transfer areas listed. Since most checked more than one area, the numbers presented below in the breakout by Division reflect multiple answers. Under "others," only three technology items were identified that had not been listed: development and availability within the Corps of field-office-friendly software such as WET, wetland newsletters, and regular conferences on wetlands.

	Technical Reports	Tech Notes	Training Courses	Workshops	DOTS-like Responses	Other
LMVD	9	4	12	8	7	0
MRD	15	11	14	13	7	0
NAD	14	6	17	9	9	2
NCD	13	9	15	15	5	2
NED	2	2	1	1	2	0
NPD	16	18	14	15	16	2
ORD	8	4	6	8	8	0
POD	0	0	1	1	1	0
SAD	16	7	14	15	9	1
SPD	7	1	5	8	5	1
SWD	11	5	12	8	14	3
TOTALS	111	67	111	101	83	11

NUMBER OF RESPONSES



### Question 17

21. When designing a wetland mitigation plan, do you need to know (five items listed)?

**ANSWER:** A total of 180 respondents checked one or more items in this question. Numerous respondents checked the top four, then made suggestions for other items under Question 18. The response to this question appears to indicate a great need for wetlands technical information in Districts and Divisions.

	Costs to Construct	Design Criteria	Assessment Methods	How to Implement Mitigation Plans	Other
LMVD	13	13	12	9	1
MRD	13	13	15	11	1
NAD	17	19	20	13	3
NCD	17	22	20	15	0
NED	4	3	3	2	1
NPD	21	19	19	15	6
ORD	8	7	8	5	0
POD	1	1	1	1	0
SAD	20	25	25	19	1
SPD	5	8	5	3	3
SWD	16	17	16	10	2
TOTALS	135	147	144	103	18

### Question 18

22. What qualities would you like to incorporate into a wetland mitigation protocol?

ANSWER: Most of the people who responded to Question 17 also gave responses to this question. A wide range of items were mentioned, but in general most fell into six categories. All responses are noted in the breakout by Division presented below.

	LMV	MRD	NAD	NCD	NED	NPD	ORD	POD	SAD	SPD	SWD	TOTAL
Restoration and development guidelines	7	13	15	11	2	14	5	0	17	7	13	104
Costs	4	7	8	8	0	7	4	0	8	2	7	55
Assessment methods	4	6	12	8	2	11	5	0	17	3	9	77
Plan design	3	6	3	3	1	4	2	0	5	1	2	30
Plan implementation	2	6	3	1	0	5	2	0	4	1	2	26
Monitoring guidelines	0	2	3	1	1	2	2	0	4	2	2	19
No net loss how-to	2	0	0	0	0	0	0	0	0	0	1	3
How to make wetland presentations	1	0	0	0	0	0	0	0	0	0	0	1
Policy clarification	0	0	0	1	0	4	1	0	0	0	1	7
Section 404 clarification	0	1	0	0	0	0	0	0	0	0	0	1
More in-kind efforts	1	0	0	0	0	0	0	0	0	0	0	1
Contaminants	1	0	0	0	0	0	0	0	0	0	0	1
Management plans	0	0	0	1	0	0	0	0	0	0	0	1
Develop matrix approach	0	0	0	1	0	0	0	0	0	0	0	1
Incremental analysis	0	0	0	0	0	0	0	0	1	1	0	2
Qualified contractors	0	0	0	0	0	0	0	0	1	0	1	2

### Question 19

23. Are you familiar with some mitigation techniques not employed by your office but that may be potentially useful in satisfying your needs?

**ANSWER:** Only 158 respondents answered this question, with 34 (22 percent) affirmatives and 124 (78 percent) negatives. Most respondents apparently are not aware of the wide range of mitigation techniques available for use by Districts. However, some respondents noted that they were aware of many techniques but were never given a chance in their District to use them. A breakout by Division is presented below. The most identified technique of which respondents were aware was mitigation banking, but most were not using the technique.

	NO	YES	Mitigation Techniques Named
LMVD	13	2	None given
MRD	15	4	Use of structures, bioengineering
NAD	17	4	Landfill, stream, and wetland cleanup efforts, mitigation banking
NCD	21	2	Mitigation banking, good seed sources
NED	3	0	None given
NPD	13	7	Mitigation banking
ORD	5	2	None given
POD	1	0	None given
SAD	20	5	Bottomland hardwood seeding, mitigation banking
SPD	4	3	None given
SWD	10	5	Streambank restoration, GIS use, banking
TOTALS	124	34	

## Question 20

24. We intend to provide the finding of any mitigation protocol in a user's manual. Would another method of presentation or other topics be more useful?

**ANSWER:** A total of 151 respondents answered this question, but results are confusing due to the phrasing of the question. A total of 109 (72 percent) indicated that a user's manual would be helpful. A yes or no answer could have meant they had either a new topic to suggest or a new type of presentation format to suggest. Most who explained their answer, however, stated that they had additional topics and ideas to convey. A breakout by Division is presented below.

	NO	YES	Other Topics or Types of Presentations
LMVD	11	2	Short courses, more training
MRD	11	6	Training courses, videos, how-to manual for permit applicants
NAD	18	5	Design manual, workshops
NCD	16	4	Workshops, videos, databases, training courses, policy guidance
NED	2	1	Site-specific criteria
NPD	3	9	Put regs in the manual, use electronic bulletins, seminars for supervisors, workshops
ORD	5	3	Videos, workshops
POD	0	1	More training courses
SAD	22	5	Workshops, training courses, more DOTS, functioning interdisciplinary teams
SPD	7	0	Make the manual regional
SWD	14	6	Videos, training courses, software like WES, workshops, databases
TOTALS	109	42	

## Question 21

25. Can you identify any mitigation sites which were viewed as successful by your District? Any unsuccessful?

**ANSWER:** Most respondents did not answer this question, or stated that they knew of no mitigation projects in their Districts that had worked. Many of those who offered sites simply identified them as "x-number of acres" of marsh established, with no site names or locations. The following sites were listed one or more times.

Scott Paper Company wetland, Alabama  
Chevron wetland, Alabama  
White River, Arkansas, greentree reservoirs  
Blue River, Colorado, wetland  
Two-Mile Island, Apalachicola, FL, wetland  
Bottomland hardwood restoration in Georgia  
Helena, AR, 49-acre marsh  
Main Pass, LA, marsh development through levee management  
Tensas Parish, Louisiana, bottomland hardwood buffer zone development  
Scrub-shrub wetland in Texas and SWD  
Evanston wetland (state not given)  
Jackson, WY, wetland  
Unnamed 0.84-acre wetland in Maryland  
Hartz Mountain, NJ, timber properties marsh  
Canal No. 2 6-acre wetland  
Weaver Bottoms, MN (5,000 acres)  
Mud Lake, MN (3,000 acres)  
Westchester Lagoon wetland (no state given)  
Donlin Island/Venice Cut, California, riverine wetlands  
Lincoln Street marsh, Seattle, WA  
Koll Business Center (state not given)  
Chief Joseph Dam wetland (8 acres)  
Lake of the Woods, Minnesota  
Greentree reservoirs in Mississippi delta

## Question 22

26. List any additional points, questions, and/or problems relative to wetland mitigation information which should be addressed.

**ANSWER:** It appears that by page 6 of the questionnaire, respondents had either gotten tired of answering so many questions or did not have any additional comments to offer. Most did not respond to this question. The following general list of items and questions were taken from questionnaires across all Divisions.

Need MORE staff to cover wetlands problems  
Need precise how-to guidelines on building wetlands  
Clarify no net loss  
Discuss compensation  
Why a wetland protocol?  
Need help with cost estimates, and need MORE funding

Mitigation banking  
Identifying good wetland soils for restoration attempts  
Help us learn to pick sites that will be successful  
Need three manuals, not just one  
Need regional manuals, not one big one  
Districts have conflicting missions among their offices  
Need tighter regulations on permit applicants  
Put design burden and responsibility on applicants  
Clarify existing policy  
Give new policy we can work with  
Address riparian habitats  
Address secondary impacts of flood control projects  
Address avoidance as mitigation  
Need more training  
Need more cross/office communication and work experience  
Need money for mitigation  
Corps policy hinders accomplishing anything in wetlands  
Dubious civil works future in the Corps-what will come next?  
Address bioengineering  
Need administration to let us form workable interdisciplinary District teams that can get the job done, then leave us alone so we can get it done!  
Need to establish an incentive pay raise system for those who are doing the job, so that they won't leave the Corps after they gain experience and expertise

### Summary

27. Answers provided by District and Division personnel indicated great interest in wetlands and a high level of expertise in their work areas. Their patience in providing detailed technical responses and their thoughtful answers and recommendations for improvements were greatly appreciated, and made compiling and analyzing data from the questionnaire a challenge. The results from the survey will ultimately become available Corps-wide, and at the discretion of Headquarters, US Army Corps of Engineers, possibly to other agencies with which the Corps works on a day-to-day basis. A number of questionnaires were still being returned as late as 28 August 1989. Further analyses are planned at a later date which will provide more precise information from the survey.